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Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
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*EUROPE

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*OXIDATION

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*OXIDE CATHODES

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*OXIDES

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*OXYGEN

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*OXYGEN POISONING

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*PARAMAGNETIC SALTS

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*METALS

A THEORY DESCRIBING THE MECHANICAL PROPERTIES OF METALS IS PRESENTED, BASED ON THE METHODS OF PHYSICS, METALLURGY, AND APPLIED MECHANICS.
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*NON-DESTRUCTIVE TESTING

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*NONLINEAR SYSTEMS

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*NUCLEAR ENERGY

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*NUCLEAR EXPLOSIONS

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AD-277 900 DIV. 20

*NUCLEAR FLUORESCENT SCATTERING

THE INTERNAL FIELDS ACTING ON NUCLEI IN SOLIDS ARE INVESTIGATED WITH THE USE OF THE TECHNIQUES OF MOSSBAUER ABSORPTION AND THE PERTURBATION OF THE GAMMA-GAMMA CASCADES.
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*NUCLEAR FORCES

THE INTERNAL FIELDS ACTING ON NUCLEI IN SOLIDS ARE INVESTIGATED WITH THE USE OF THE TECHNIQUES OF MOSSBAUER ABSORPTION AND THE PERTURBATION OF THE GAMMA-GAMMA CASCADES.
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*NUCLEAR MAGNETIC MOMENTS

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*NUCLEAR PHYSICS

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*NUCLEAR RESONANCE

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*NUCLEAR SPINS

NUCLEAR ALIGNMENT OF CE-141 WAS PRODUCED BY ADIABATIC DEMAGNETIZATION TO VERY LOW TEMPERATURES OF CERIUM MAGNESIUM NITRATE TO DETECT THE PRESENCE OF ATTENUATION DUE TO INTERMEDIATE STATE PERTURBATION.
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*QUARTZ CRYSTALS

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*RADAR ANTENNAS

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*RADAR DUPLEXERS

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*RADAR ECHO AREAS

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AD-277 903 DIV. 6

*RADAR INTERFERENCE

FUNDAMENTAL CONCEPTS OF INTERFERENCE REDUCTION FOR COMMUNICATIONS AND RADAR TRANSMITTERS AND RECEIVERS; HIGH POWER MICROWAVE FILTERS; SHIELDINGS.
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ANALYSIS OF TIME LAPSE MOTION PICTURE DATA TAKEN OF A-SCOPE RADAR RESPONSE TO INVISIBLE TARGETS KNOWN AS ANGELS; PEAK POWER, CROSS SECTION, INTERCEPT TIME, AND VELOCITY OF TARGET; CONSISTENCY OF ANGLE ECHO CHARACTERISTICS.
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*RADAR PLOTTING

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*RADAR REFLECTIONS

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*RADAR TARGET SEEKERS

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*RADAR TARGETS

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AD-277 903 DIV. 6

*RADAR TRACKING

A TIME SERIES ANALYSIS OF RADAR OBSERVATIONS FROM SATELLITE 59, EPSILON I. BEST ESTIMATORS FOR PREDICTING ORBITAL ELEMENTS CAN BE OBTAINED WITH INDEPENDENT ESTIMATORS OF THE OBSERVATIONS THAT DESCRIBE THE PROCESS.
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*RADIATION COUNTERS

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*RADIATION EFFECTS

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AN ANNOTATED BIBLIOGRAPHY OF RADIATION EFFECTS ON ELECTRONIC COMPONENTS. 201 REFERENCES. COMPLETED FEBRUARY 1962.
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MONTHLY ACCESSION LIST 59 FROM RADIATION EFFECTS INFORMATION CENTER. INCLUDED ARE EFFECTS ON ELECTRONICS; POLYMERS; ORGANIC AND INORGANIC COMPOUNDS; METALS; CERAMICS; ETC.
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*RADIO COMMUNICATION SYSTEMS

ANTENNA COUPLER-QUALITY CHECKER FOR UHF AND VHF VOICE COMMUNICATIONS EQUIPMENT.
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*RADIO INTERFERENCE

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AD-277 558 DIV. 9

*RADIO WAVES

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*RADIOACTIVE DECAY

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AD-277 627 DIV. 20

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*RADIOACTIVE FALL-OUT

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AD-277 636 DIV. 16

*RADIOFREQUENCY AMPLIFIERS

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AD-277 596 DIV. 8

*RADIOFREQUENCY COILS

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AD-277 674 DIV. 8

*RADIOLOGICAL CONTAMINATION

HAZARDS OF RADIOACTIVE CONTAMINATION. PROTECTION AND THE USEFULNESS OF FILTRATION SYSTEMS, DETECTION AND ALARM SYSTEMS, CIVIL DEFENSE AND SOME PRACTICAL CONSIDERATIONS. 51 REFERENCES.
AD-277 677 DIV. 20

*RADIOLOGICAL DOSAGE

HAZARDS OF RADIOACTIVE CONTAMINATION. PROTECTION AND THE USEFULNESS OF FILTRATION SYSTEMS, DETECTION AND ALARM SYSTEMS, CIVIL DEFENSE AND SOME PRACTICAL CONSIDERATIONS. 51 REFERENCES.
AD-277 677 DIV. 20

*RADIOLOGICAL WARFARE

AN ASTIA BIBLIOGRAPHY ON RADIOLOGICAL WARFARE AND NUCLEAR EXPLOSIONS, CONTAINING REFERENCES ON BLAST EFFECTS, CIVIL DEFENSE, FALL-OUT PATTERNS AND PREDICTION, RADIATION EFFECTS ON FOODS AND THE ATMOSPHERE, RADIATION METERS, RADIOBIOLOGICAL EFFECTS, SAMPLING, THERMAL RADIATION AND FIRE, AND WEAPONS. 717 REFERENCES.
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*RADIOMETERS

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*RADIOPROTECTIVE DRUGS

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*RARE EARTH COMPOUNDS

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AD-277 648 DIV. 25

*REACTION KINETICS

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AD-277 672 DIV. 17

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*RECOMBINATION REACTIONS

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*RECOVERY

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*RE-ENTRY AERODYNAMICS

MATHEMATICAL ANALYSIS OF VERTICAL DESCENT TRAJECTORIES COMPUTED ON ANALOG COMPUTERS PRESENTED IN GRAPHICAL FORM.
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*RE-ENTRY VEHICLES

MATHEMATICAL ANALYSIS OF VERTICAL DESCENT TRAJECTORIES COMPUTED ON ANALOG COMPUTERS PRESENTED IN GRAPHICAL FORM.
AD-277 911 DIV. 12

*REFRACTORY MATERIALS

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AD-277 648 DIV. 25

MASS SPECTROMETRIC STUDY OF GASEOUS SPECIES IN THE B-C SYSTEM. IDENTIFICATION AND ATOMIZATION ENERGIES OF BC, B2C AND BC2 MOLECULES.
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*REFUELING IN FLIGHT

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THE FROST BEHAVIOR OF SOILS LABORATORY AND FIELD DATA FOR A NEW CONCEPT. PART I VERTICAL SORTING.
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MANUFACTURING TECHNIQUES AND PROCESSES FOR FAMILY OF 1, 10, 20, 50, AND 100 AMPERES POWER SILICON TRANSISTORS.
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AN EVALUATION WAS MADE OF 2107 MICROWAVE TRANSISTORS AS WIDEBAND AMPLIFIERS.
AD-277 596 DIV. 8

***TRANSISTORS**

MANUFACTURING TECHNIQUES AND PROCESSES FOR FAMILY OF 1, 10, 20, 50, AND 100 AMPERES POWER SILICON TRANSISTORS.
AD-277 915 DIV. 8

AN EVALUATION WAS MADE OF 2107 MICROWAVE TRANSISTORS AS WIDEBAND AMPLIFIERS.
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AD-277 657 DIV. 8

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AD-277 663 DIV. 8

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AD-277 925 DIV. 8

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SECOND-ORDER DEPENDENCE ON TRITIUM CONCENTRATION OCCURRED BELOW 1 MC/ML. RATE CONSTANTS WERE 1.4 AND 0.62 X 1/1000 ML/MC-HR, RESPECTIVELY. THE REACTION RATE WAS INDEPENDENT OF O CONCENTRATION AND SURFACE AREA AT CONSTANT TOTAL PRESSURES OVER 100 MM BUT DROPPED SHARPLY BELOW THIS VALUE.
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ELEVATED TEMPERATURE 175 TO 3000 F) TENSILE TESTS OF MO- W-BASE ALLOY SHEETS. HARDNESS, RECRYSTALLIZATION, AND BEND TRANSITION TEMPERATURE TESTS.
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PHASE EQUILIBRIUM RELATIONS OF W-C AND ZR-C SYSTEMS AT HIGH TEMPERATURES. DTA, QUENCHING, METALLOGRAPHIC, X-RAY, AND CHEMICAL TEST METHODS.
AD-277 794 DIV. 14

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DEVELOPMENT OF A HIGH-TEMPERATURE, NUCLEAR-RADIATION-RESISTANT PNEUMATIC POWER SYSTEM FOR FLIGHT VEHICLES USING A RAM AIR TURBINE.
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AD-277 530 DIV. 2

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INVESTIGATION OF INORGANIC PHOTOTROPIC MATERIALS AS A BI-OPTIC ELEMENT APPLICABLE IN HIGH DENSITY STORAGE COMPUTER MATERIALS) WRITING, READING AND ERASING PROPERTIES OF MACKMANITE.
AD-277 793 DIV. 25

***ULTRAVIOLET RADIATION**

THE ROLE OF SOLAR CORPUSCULAR AND PHOTON RADIATION IN THE FLASHES OF BRIGHTNESS OF COMETS.
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EFFECT OF SYNTHETIC SUNLIGHT ON PLANKTON OIL MONOMOLECULAR FILMS SPREAD ON SEAWATER. STABILITY AND DISSOLUTION OFF OIL FILMS) PHOTOSENSITIVITY.
AD-277 920 DIV. 14

***UPPER ATMOSPHERE**

SOLAR RADIATION AND THE IONOSPHERE, TELLURIC CURRENTS, METEOROLOGY OF THE UPPER ATMOSPHERE, SIXTEEN ARTICLES FROM USSR LITERATURE.
AD-277 726 DIV. 2

THE KINETICS OF THE REACTIVE SPECIES IN THE UPPER ATMOSPHERE WERE STUDIED.
AD-277 926 DIV. 25

***VAPORIZATION**

DESIGN AND CONSTRUCTION OF A HEAT OF VAPORIZATION CALORIMETER FOR USE IN VAPOR PRESSURE RANGING FROM 1 TO 0.01 MM HG AT 25 C. TEST METHOD APPLIED TO EVEN-NUMBERED N-ALKANES FROM OCTANE TO HEXADECANE.
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***VARIABLE CAPACITORS**

TRIMMER CAPACITORS WERE DESIGNED, PRODUCED AND SUCCESSFULLY TESTED IN MICRO-MODULES.
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ESTABLISHMENT OF A CAPABILITY TO MASS-PRODUCE A VARIABLE CAPACITANCE MICROWAVE DIODE. RELATIVE MERITS OF ALUMINA CERAMIC OVER STEATITE ARE DISCUSSED FOR A REVERSIBLE CARTRIDGE.
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DETERMINATION OF THE CHARACTERISTIC ENERGY ABSORPTION POTENTIAL OF A SPECIFIC AL HONEYCOMB CONFIGURATION. SHOCK ISOLATORS FOR AEROSPACE ESCAPE CAPSULES.
AD-277 709 DIV. 17

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MILITARY PLANNING AS A RESOURCE ALLOCATION PROBLEM USING SPECIFIC WEAPONS AGAINST GIVEN TARGETS. DISTRIBUTION OF RESOURCES (PRODUCTION AND USE OF WEAPONS) AMONG COMBINATIONS OF TARGETS AND WEAPONS SO THAT VALUE OF SURVIVING TARGETS IS MINIMIZED. MATHEMATICAL MODEL.
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THEORETICAL RESEARCH ON HYDROMAGNETIC WAVE PROPAGATION.
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RESEARCH ON MILLIMETER WAVE PROPAGATION AT HIGH ALTITUDES.
AD-277 903 DIV. 8

AN EXPERIMENTAL AND THEORETICAL INVESTIGATION OF ELASTIC WAVE PROPAGATION IN A CYLINDER BY HIGH-SPEED COMPUTERS.
AD-277 604 DIV. 25

***WAVEGUIDES**

RESEARCH WAS CONDUCTED ON FAILURE MECHANISMS IN MICROWAVE TRANSMISSION LINES AT ULTRA-HIGH POWER LEVELS.
AD-277 925 DIV. 8

***WEATHER FORECASTING**

NONCHARACTERISTIC FILTERING OF METEOROLOGICAL NOISE WAVES.
AD-277 715 DIV. 2

EXPERIMENTS WITH THE UNFILTERED 5-LAYER MODEL.
AD-277 716 DIV. 2

***WELDED JOINTS**

THE END MOMENT - END ROTATION CHARACTERISTICS OF WIDE FLANGE STEEL BEAM COLUMNS ARE DISCUSSED.
AD-277 912 DIV. 13

***WELDING**

HEAVY DUTY ULTRASONIC SPOT- AND SEAM-WELDERS OR 0.10-IN. REFRACTORY METAL AND SUPERALLOY SHEETS.
AD-277 660 DIV. 26

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THERMODYNAMIC AND KINETIC STUDIES ON HAFNIUM AND ZIRCONIUM BORIDES AND CARBIDES AT TEMPERATURES TO 3000K AND IN VARIOUS ATMOSPHERES.
AD-277 500 DIV. 14

FACTORS AFFECTING THERMAL SHOCK RESISTANCE OF POLYPHASE CERAMIC BODIES USING THE MODEL SYSTEM ZIRCONIUM CARBIDE-GRAPHITE.
AD-277 605 DIV. 14

PHASE EQUILIBRIUM RELATIONS OF W-C AND ZR-C SYSTEMS AT HIGH TEMPERATURES. DTA, QUENCHING, METALLOGRAPHIC, X-RAY, AND CHEMICAL TEST METHODS.
AD-277 794 DIV. 14

***ZIRCONIUM COMPOUNDS**

THERMODYNAMIC AND KINETIC STUDIES ON HAFNIUM AND ZIRCONIUM BORIDES AND CARBIDES AT TEMPERATURES TO 3000K AND IN VARIOUS ATMOSPHERES.
AD-277 500 DIV. 14

***ZIRCONIUM COMPOUNDS**

THERMODYNAMIC AND KINETIC STUDIES ON HAFNIUM AND ZIRCONIUM BORIDES AND CARBIDES AT TEMPERATURES TO 3000K AND IN VARIOUS ATMOSPHERES.
AD-277 500 DIV. 14

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-277 503 Div. 1, 12
(TISTA/GEC) OTS price $4.60

McDonnell Aircraft Corp., St. Louis, Mo.
GAM-72 LAUNCH GEAR STRUCTURAL DESIGN CRITERIA FOR PACKAGE LOADING,
by Stanley A. LaFavor. 1 Jan 59, rev. 1 June 62, 34p. incl. illus. 10 refs. (Rept. no. 6413, rev. A, supersedes rept. no. 6413, AD-209 747)
(Contract AF 33(600)29850)
Unclassified report

DESCRIPTORS: *Guided missiles - Radar decoys, *Loading, *Aircraft - Structures. Countermeasures, Air to air, Launching sites, Launching, Ejection, Release mechanisms, Jet bombers, Packaging, Attachment, Bomb racks, Bomb shackles, Design, Specifications, Shock, Vibration, Acceleration.

Detailed structural criteria are presented for the GAM-72 Quick Loading Launch Gear. It correlates the use of criteria and loads data from existing GAM-72 documents as applicable to the design of the launch gear. All structural requirements for the launch gear design including effects of bomber support structure, ground handling, and loading environments and stiffness requirements are included to make it a complete source for the structural design of the launch gear. Unless specified, all requirements presented apply to both the B-47 and B-52 installations and are to include shackles, carriages, track assembly, backup structure, and umbilical support mechanism. (Author)

AD-277 547 Div. 1, 19
(TISTA/VGW) OTS price $11.50

Airborne Instruments Lab., Inc., Deer Park, Long Island, N. Y.
AN ANALYSIS OF THREE-DIMENSIONAL NAVIGATION AND TRAFFIC CONTROL IN THE TERMINAL AREA (SLANT AIRWAYS),
by E. N. Hooton. Jan 62, 145p. incl. illus. table, 6 refs. (Rept. no. 8420-1)
(Contract FAA/BRD-357)
Unclassified report

DESCRIPTORS: *Air traffic control systems - Effectiveness, *Flight paths - Aircraft, *Airports - Radio navigation. Radio equipment, Jet planes, Aviation safety, Aeronautics.

The desirability and feasibility of slant airways in airport terminal areas are considered with regard to aircraft performance and capability in climb and descent as well as navaid accuracy. Present-day traffic control procedures are evaluated. The impact of slant airways on flight planning, in-flight procedures, and traffic control techniques is discussed. These considerations, together with aircraft/pilot capabilities and navaid accuracy, are then considered as interlocking factors that determine the requirements of a terminal area slant airway complex. The problems of three-dimensional displays for the ground controller are surveyed. The possibilities are evaluated of introducing a limited number of slant airways using present very high frequency omnidirectional radio range air traffic control (VORTAC) equipment to provide climb/descent corridors for military interceptors and unrestricted descent airways for the supersonic transport. Finally, the aspects of automatic flight and terminal area sequencing, relative to slant airways, are reviewed. (Author)

AD-277 618 Div. 1
(TISTA/GEC) OTS price $2.60

Naval Air Test Center, Patuxent River, Md.
INVESTIGATION OF PROBLEMS ASSOCIATED WITH ENGINE FAILURE AND HIGH SPEED AUTOROTATION ENTRY OF HSS/HUS HELICOPTERS.
Rept. no. 1 (Final),
by F. W. Taylor and B. W. Witherspoon. 25 May 62, 1v. incl. illus. (Problem assign. no. RAD322-45; Serial no. FT23-146)
Unclassified report

DESCRIPTORS: *Helicopters - Flight testing, *Airplane engines. Simulation, Failure (Mechanics), Take-off, Landing, Turbulence, Flight speeds.

An investigation was made of the stability and control problems associated with engine failure and high speed autorotative entry of model HSS/HUS helicopters. At any condition of high power (climb, OGE hover, high speed flight) immediate pilot reaction is required to satisfactorily enter autorotation. Additional preparedness is also required of the pilot during operation at low rotor speed or during operation under turbulent air conditions. Information based on the evaluation is included for incorporation in the Flight Manual. (Author)

AD-277 643 Div. 1, 13, 25
(TISTM/EJH) OTS price $19.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DESIGNING SANDWICH PANELS (Raschet Trekhsloynykh Paneley),
by A. Ya. Aleksandrov, L. E. Bryukker and others. 15 June 62, 316p. incl. illus. tables, 136 refs. (Trans. no. FTD-TT-62-206 of Gosudarstevnnoye Nauchno-Tekhnicheskoy Izdatel'stvo Oborongiz, Moskva 1960)
Unclassified report

DESCRIPTORS: *Sandwich panels, *Sandwich construction, *Honeycomb cores. Stresses, Loading, Elasticity, Load distribution, Stability, Theory, Mathematical analysis, Design, Mechanical properties, Tests, Test methods.

This book contains formulas and charts for strength calculations for flat and curved sandwich panels with various types of cores (uniform foamed-plastic cores, corrugated cores, etc.) under various conditions of constraint and for various combinations of applied loads. Data are given on the choice of optimum panel constants, and on strength tests for panels. The book is intended for design engineers, scientists, and students in the appropriate specialties. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-277 530 Div. 2
(TISTP/FR) OTS price $11.50

Tactical Air Command, Langley Air Force Base, Va.
SUNRISE AND SUNSET TIMES AT SELECTED LOCATIONS,
by H. J. Talley, Jr. and N. E. Brake. June 62, 155p. incl. tables (Operations Analysis technical memo. no. TAC OA TM-119)
Unclassified report

DESCRIPTORS: *Sun, *Sky brightness, *Twilight. Diurnal variations, Time, Tables.

The purpose of this publication is to provide TAC planners with a simple, rapid source of the Zulu times of sunrise, sunset, first light and last light at sea level, 18,000 ft and 30,000 ft, for selected locations of particular interest to TAC. It was first produced in 12 copies for local use only. The interest generated by the original publication led to the request for this augmented publication. (Author)

AD-277 534 Div. 2
(TISTP/FR) OTS price $7.60

Washington U., Seattle.
DETAILED ANALYSES OF SELECTED PACIFIC STORMS BASED ON CONTINUOUS RADAR RECORDS AND SHORT-INTERVAL SERIAL ASCENTS. VOLUME III. CASE OF FEBRUARY 7-10, 1961,
by Carl W. Kreitzberg and Richard J. Reed. Mar 62, 64p. incl. illus. tables, 2 refs. (Technical rept. no. 5)
(Contract AF 19(604)5192, Proj. 8641)
(AFCRL 62-447) Unclassified report

DESCRIPTORS: *Storms. Pacific Ocean, Washington, Radar analysis, Meteorological radar, Meteorological charts, Meteorological data.

Extensive data and a brief discussion pertaining to the two fronts which passed Seattle on February 8 and 9, 1961 are given. The data include: (1) serial ascent radiosonde data, both listed and plotted; (2) radar records from the continuously recording 1.87-cm vertically-directed radar; (3) time section; (4) synoptic surface and constant pressure analyses; (5) hourly surface charts; (6) barograph and temperature traces; and (7) pilot reports. The first front was a dissipating warm-type occlusion when it reached the coast. Evaporational cooling had a marked effect on the thermal field immediately in advance of this front. The second frontal system, on the other hand, was intensifying and not quite occluded when it reached Seattle. The warm sector was well defined but exceptionally narrow. From the preliminary analyses it appears that subsidence preceded the cold front from 700 mb to 500 mb. (Author)

AD-277 536 Div. 2
(TISTP/JW) OTS price $8.10

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
PROPERTIES OF ICE,
by Rudolf Brill and Paul R. Camp. May 61, 75p. incl. illus, tables, refs. (Research rept. no. 68)
Unclassified report

DESCRIPTORS: *Ice. Crystal structure, Dielectric properties, Polarization, Thermal expansion, Viscosity, Elasticity.

Results of a number of studies on ice during the period 1955-1959 are summarized. Sections are entitled as follows: growth of large single crystals of ice and ammoniumfluoride ice; lattice constants of mixed crystals of ice and ammoniumfluoride; degree of perfection of glacial ice crystals; thermal motion in ice and heavy ice; viscoelastic properties of ice; diffusion of NH4F through ice; dielectric relaxation; effect of pressure on dielectric properties; and investigation of the polarity of ice crystals. (Author)

AD-277 537 Div. 2
(TISTB/AW) OTS price $4.00

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
BIBLIOGRAPHY ON SNOW, ICE AND PERMAFROST WITH ABSTRACTS,
by Thomas E. Hughes, Robert McCollum and others. Jan 61, 245p. (SIPRE rept. no. 12, vol. 15)
(DA Proj. no. 8-66-02-400)
Unclassified report

DESCRIPTORS: *Bibliography - Arctic regions, *Snow, *Ice, *Permafrost. Antarctic regions, Glaciers, Avalanches, Geology, Oceans, Lakes, Meteorology, Roads, Construction, Foundations (Structures), Buildings, Transportation, Greenland, USSR, Geography, Atmospheric sounding, De-icing systems, Airplanes, Trafficability, Maps, Military engineering, Snow removal.

The primary purpose of the bibliography is to aid USA SIPRE and others conducting research on scientific and engineering aspects of snow, ice, and perennially and seasonally frozen ground. Included are such diverse topics as airplane icing, the characteristics of sea ice, various aspects of snow removal and ice control, cold regions engineering, and field investigations of snow cover, land ice, and permafrost. Each entry contains, in addition to an informative abstract, the necessary bibliographic information, a code designating a library possessing a copy of the original (cf. p. iv), and its assigned call number. Universal Decimal Classification numbers are taken from the schedules prepared by the Scott Polar Research Institute, Cambridge, England. (Author)

AD-277 538 Div. 2, 25
(TISTP/WH) OTS price $5.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
THE NARROW FREE INFINITE WEDGE ON AN ELASTIC FOUNDATION,
by D. E. Nevel. July 61, 24p. incl. illus. tables, 3 refs. (Research rept. no. 79)
Unclassified report

DESCRIPTORS: *Ice, *Mechanical properties. Failure (Mechanics), Experimental data, Elasticity, Mathematical analysis, Stresses.

The theory of a plate on an elastic foundation will closely predict the radial cracks observed in loading tests on floating ice sheets. However, the plate theory does not predict accurately the circumferential crack which forms ultimately with increased loading. The wedge theory is developed in an attempt to better predict the location and magnitude of the stresses causing the circumferential crack. The results obtained can be applied to help predict the ultimate bearing capacity of an ice sheet, provided the modulus of elasticity and flexural strength of the ice are known. (Author)

AD-277 665 Div. 1
(TISTA/GEC) OTS price $1.60

Beech Aircraft Corp., Wichita, Kans.
PROTOTYPE DEVELOPMENT MODEL 385 AIR REFUELING STORE.
Interim rept. no. 24, 1-31 May 62,
by C. V. Lassmann. 8 June 62, 4p. illus.
(Engineering rept. no. 4429)
(Contract NOw 60-0060-c)
Unclassified report

DESCRIPTORS: *Refueling in flight. Refueling pumps, Fuel hose, Tests, Low temperature research, Towed bodies, Aircraft equipment, Aircraft protuberances, Fuel tanks, Aeronautical booms.

Development of the Beech Model 385 Air Refueling Store continued. Additional endurance cycling was accomplished on the prototype store; however, attempts to operate at extreme low temperatures were unsuccessful. Detail investigation and component testing is in process to resolve problems related to low temperature operation. Additional endurance testing was accomplished on P-2 store, with a total of 1500 response/fuel transfer cycles. Two attempts were made for operation at low temperature (-65 F) and resulted in inability of the store to extend. (Author)

AD-277 810 Div. 1, 5
(TISTA/GEC) OTS price $4.60

Army Arctic Test Board, Fort Greely, Alaska.
SERVICE TEST OF DISPENSER SET, WIRE, AIRCRAFT AN/ATE-1( ).
9 June 62, 43p. incl. illus. tables (Proj. ATB 4-52)
Unclassified report

DESCRIPTORS: *Field wire communication systems, *Air drop operations - Field wire. Helicopters, Liaison planes, Arctic regions, Flight testing, Reliability, Effectiveness.

A determination was made of the suitability and adequacy of the Dispenser Set, Wire, Aircraft, AN/ATE-1, for Army use under arctic winter conditions. (Author)

AD-277 913 Div. 1
(TISTA/GEC) OTS price $5.60

General Dynamics/Convair, San Diego, Calif.
DEVELOPMENT OF A HIGH-TEMPERATURE, NUCLEAR-RADIATION-RESISTANT PNEUMATIC POWER SYSTEM FOR FLIGHT VEHICLES.
Quarterly rept., 25 Mar-24 June 62.
24 June 62, 53p. incl. illus. tables, 2 refs.
(Rept. no. GD/C-62-198)
(Contract AF 33(616)7582)
Unclassified report

DESCRIPTORS: *Auxiliary power plants, *Pneumatic servomechanisms, *Control systems - Aircraft, *Turbo-ramjets. Compressors, Power supplies, Aircraft equipment, Rotary compressors, High pressure compressors, Radiation damage, Radiation effects, Nuclear propulsion, Aircraft nuclear propulsion, Control valves, Pressure regulators, Check valves, High pressure valves, Pneumatic values, High temperature research, Hydraulic power systems, Feasibility studies, Tests, Design.

The development of a high-temperature, nuclear-radiation-resistant pneumatic power system for flight vehicles continued. The design, development and testing of a typical pneumatic system capable of operating under wide temperature excursions while in the presence of nuclear radiation continued. A ram air turbine-driven compressor was selected as the most feasible means of supplying the pneumatic power source. The compressor and a number of other components including a rotary actuator, servo control valve, pressure regulator, relief valve, accumulator, filter, and a check valve, are under development. These components will be tested as parts of a pneumatic system, under both high temperature and nuclear radiation environments. (Author)

AD-277 929 Div. 1
(TISTA/GEC) OTS price $2.60

Naval Air Test Center, Patuxent River, Md.
EVALUATION OF AN IMPROVED VERSION OF A DOUGLAS MODEL D-704 AIR REFUELING STORE.
Rept. no. 1 (Final),
by R. P. Prichard. 6 June 62, 26p. incl. illus.
(Serial no. ST31-252)
Unclassified report

DESCRIPTORS: *Refueling in flight. Reliability, Effectiveness, Flight testing, Jet bombers, Attack bombers, Naval aircraft, Towed bodies, Fuel hose, Refueling pump, Hose reels, Hose couplings, Aircraft protuberances, Fuel tanks.

A service suitability evaluation was made of 12 modifications to a Douglas D-704 Air Refueling Store. The AR store was carried on A4D-2/2N tankers for 45 flights for 80 flight hr. Various receiver airplanes were used. The increased hose tension, modified reel-in snubbing valve, automatic fuel pump shut-off switch, modified hose reel fuel connector fitting, replaced fuel flow regulator, deletion of the pressure actuated shut-off valve and installation of high level float switch were satisfactory for service use. After local modification the drogue lighting system and hose illumination light were satisfactory. The extendible dump valve, modified hose, and modified hose cutter knife were unsatisfactory for service use. (Author)

AD-277 931 Div. 1
(TISTA/GEC) OTS price $3.60

Naval Air Test Center, Patuxent River, Md.
SERVICE SUITABILITY EVALUATION OF PROTOTYPE BEECH MODEL 385 AIR REFUELING STORE.
Rept. no. 1 (Final),
by L. F. Vogt. 20 Apr 62, 1v. incl. illus.
(Serial no. ST31-171)
Unclassified report

DESCRIPTORS: *Refueling in flight. Aeronautical booms, Reliability, Effectiveness, Flight testing, Bombers, Jet bombers, Jet fighters, Naval aircraft, Towed bodies, Fuel hose, Attack bombers, Aircraft protuberances, Fuel tanks.

A suitability evaluation was conducted of a prototype Beech Aircraft Corporation (BAC) model 385 air refueling (AR) store carried on a B-26C tanker. The store, designed for use on F4H, A2F, and A4D type airplanes, was equipped with a BAC constant drag type drogue. A total of 212 dry engagements were made with F8U, A3D, F9F, and FJ type receiver airplanes. The envelope of evaluation was restricted to 250 KIAS and altitudes below 10,000 ft because of the B-26C tanker limitations. Except for minor deficiencies, the AR store demonstrated generally satisfactory operational characteristics, and excellent reliability and maintainability. The vertical separation provided by the boom configuration and the excellent stability of the drogue should enhance the operational suitability of the system. The store was not cleared for flight on naval airplanes, but a fit check with A4D and F4H type tanker airplanes was demonstrated on the ground. (Author)

MAY 1960.
Mar 62, 1v. incl. illus. tables (Publication in meteorology no. 49)
(Contract AF 19(604)8431)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Meteorological charts, *Stratosphere. Temperature, Barometric pressure, Wind, Periodic variations, Northern hemisphere.

AD-277 565 Div. 2
(TISTP/FR) OTS price $6.60

Radiation Lab., U. of Michigan, Ann Arbor.
ATMOSPHERIC PROPAGATIONS FROM A NUCLEAR EXPLOSION. Final rept.,
by R. F. Goodrich, L. M. Hocking, and D. B. van Hulsteyn. Mar 62, 57p. incl. illus. tables, 13 refs. (Rept. no. 2886-2-F)
(Contract AF 19(604)5470, Proj. 7637)
(AFCRL 62-621) Unclassified report

DESCRIPTORS: *Shock waves, *Microbarometric waves. Nuclear explosions, Blast, Wind, Atmosphere.

The pressure pulse at large distances from a nuclear explosion is investigated. A source representation is established which produces parameters characteristic of these explosions on a surface enclosing the source. An integral equation for the pressure is obtained in terms of a ring source Green's function, where the integration extends over the source. Pulse forms are obtained for explosions on the ground and in the atmosphere when various temperature models are considered. When the stratosphere is assumed to be either of the isothermal or thermospheric type, a general theory is established for determining the number of modes of propagation. In addition, a method for examining the dispersive effect of local winds is established. (Author)

AD-277 566 Div. 2
(TISTB/AW) OTS price $14.00

Marine Lab., U. of Miami, Coral Gables, Fla.
A REPORT OF DATA OBTAINED IN FLORIDA STRAITS AND OFF THE WEST COAST OF FLORIDA, JANUARY-JUNE 1961.
Apr 62, 200p. incl. illus. tables (Rept. no. 62-4; Rept. no. ML 62133)
(Contract Nonr-84001)
Unclassified report

DESCRIPTORS: *Hydrographic surveying. Oceanography, Florida Straits, Bathythermographic data, Depth indicators, Depth finding, Temperature charts, Salinity, Oceanographical data, Oceanographical charts, Tables, Collecting methods, Gulf of Mexico, Water waves.

Data were collected during the first six months of 1961 on seven cruises with the R/V GERDA and three cruises with the M/V GREEN SEAS in Florida Straits and the eastern part of the Gulf of Mexico. The data were obtained for studies of the hydrographic conditions prevailing in Florida Straits and adjacent waters, with particular regard to the kinematics of the water movements and also to the physical environment of the shrimp population inhabiting Florida Bay. The tracks of the vessels and the positions at which observations were made are shown in charts immediately preceding the list of data relating to each cruise. (Author)

AD-277 597 Div. 2
(TISTP/FR) OTS price $8.60

Army Transportation Board, Fort Eustis, Va.
THE PHYSICAL ENVIRONMENT OF NYEBOE LAND, NORTH GREENLAND,
by Frank Ahnert. June 62, 85p. incl. illus. 10 refs.
Unclassified report

This paper is a supplement to the U. S. Army Transportation Corps' Report, Arctic Projects, Greenland 1959.

DESCRIPTORS: *Greenland, Terrain, Geology, Geophysics, Trafficability, Glaciers, Climate, Inland waterways.

After outlining what is currently known - or can fairly safely be deduced - about weather, climate, geology, and the glaciers and the hydrography of the area, the three major landform regions of Nyeboe Land and their characteristic terrain features are discussed, as well as the terrain of each of the 26 areal sections into which Nyeboe Land has been subdivided. For each of these sections, the possibilities of access and traverse are discussed with the assumption that low-ground pressure tracked motor vehicles would be used as the means of transportation. The sectional terrain analysis is followed by a discussion of the means and routes of access to Nyeboe Land as a whole, of the routes through each area, and of potential major camp sites. (Author)

AD-277 645 Div. 2
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE ROLE OF SOLAR CORPUSCULAR AND PHOTON RADIATION IN THE FLASHES OF BRIGHTNESS OF COMETS,
by V. I. Cherednichenko. 7 May 62, 15p. incl. tables, 18 refs. (Trans. no. FTD-TT-62-179 of Izvestiya Glavnoy Astronomicheskoy Observatorii Akademii Nauk Ukrainskoy SSR 3:94-104, 1960)
Unclassified report

DESCRIPTORS: *Comets, *Solar energy, *Ultraviolet radiation. Photons, Radiation effects, Translations, Brightness.

AD-277 715 Div. 2, 15
(TISTP/JW) OTS price $3.60

Deutscher Wetterdienst, Frankfurt (Germany).
NONCHARACTERISTIC FILTERING OF METEOROLOGICAL NOISE WAVES,
by K. Hinkelmann. 31 Dec 61, 36p. incl. illus. 4 refs. (Technical note no. 1)
(Contract AF 61(052)373)
(AFCRL 62-657) Unclassified report

DESCRIPTORS: *Sound ranging, *Weather forecasting, *Hydrodynamics. Acoustic filters, Wave characteristics, Linear systems, Oscillation.

A more general process to filter out high frequent oscillations from the hydrodynamic equations is studied. In contrast to the usually applied filters in numerical weather prediction, the studied process leaves the equations of motion completely untouched, but modifies the remaining equations. The filtering procedure is based on the assumption, that in the divergence equation, differentiated with respect to time, the total time derivative of the wind divergence is zero. A diagnostic equation results defining an auxiliary divergence which is used to approximate those divergence terms considered to be

AD-277 539 Div. 2
(TISTP/FR) OTS price $1.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
A STUDY OF ICE SINTERING,
by Daisuke Kuroiwa. Feb 62, 8p. incl. illus. 5 refs. (Research rept. no. 86)
Unclassified report

DESCRIPTORS: *Snow, *Ice, *Sintering. Crystals, Adhesion, Growth.

Whenever ice particles are brought together they will show a tendency to stick to one another forming necks (ice bonds) which grow with time. This has been explained in several ways and most recently as due to a sintering process. The purpose of this report is to re-examine the mechanism which gives rise to the neck growth. Small ice spheres 20-500 microns in radius were used to study the growth rate of the ice bond at various temperatures in saturated air and kerosene environments. The results indicate that ice bonding or adhesion takes place as a result of solid diffusion (mass transfer) thus confirming the sintering process as the responsible mechanism.

AD-277 540 Div. 2
(TISTP/JW) OTS price $4.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
STUDIES OF SALT ICE. I. THE TENSILE STRENGTH OF NaCl ICE,
by W. F. Weeks. Aug 61 59p. (Research rept. no. 80)
Unclassified report

DESCRIPTORS: *Sea water, *Ice, *Tensile properties. Crystal structure, Density, Salinity.

Ice samples from fresh water and at salinities ranging from 1-22% were prepared in a tank designed to simulate the one-dimensional cooling of natural water bodies. Phase and density relations were computed for these salinities in the temperature range 0 to -35 C and a determination made of the dependence of ring-tensile strength of the ice samples on temperature, brine volume, salt and water volume, and thermal history. The results indicate that the strength of fresh water ice is essentially temperature independent in the temperature range -10 to -30 C; the strength of ice containing crystals of salt and water is essentially independent of the temperature of the sample and the volume of salt and water in the ice. The strength of salt ice at temperatures between -5 C and the eutectic point (-21.2 C) decreases with an increase in the volume of brine in the ice and can be considered a unique function of the brine volume, independent of the individual temperature and salinity values. It is suggested that the strength of fresh water ice should be considered as a limit which is approached but not exceeded by salt ice.

AD-277 541 Div. 2
(TISTP/FR) OTS price $3.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
ELASTIC PROPERTIES OF PROCESSED SNOW WITH REFERENCE TO ITS INTERNAL STRUCTURE,
by Ukichiro Nakaya. Oct 61, 25p. incl. illus. 8 refs. (Research rept. no. 82)
Unclassified report

DESCRIPTORS: *Snow. Elasticity, Density.

Young's modulus was measured as a function of density and age hardening for snow processed by Peter and Snowblast millers during the summer of 1959 at Site 2 located 220 miles E. of Thule near 78 degrees N lat. and altitude 7000 ft. For processed snow, as for naturally compacted snow, a linear relationship exists for Young's modulus density at densities above 0.5 g/cm3 and an exponential relationship for densities below this value. Thin section studies indicated that the number and size of bonds determine Young's modulus. Bonding begins a few hours after deposition by the snow miller; the bonds develop to approximately 0.2 mm in diam some 20 days after deposition. (Author)

AD-277 542 Div. 2
(TISTP/FR) OTS price $1.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
EQUILIBRIUM PROFILE OF ICE CAPS,
by Johannes Weertman. Sep 61, 12p. incl. illus. 13 refs. (Research rept. no. 84)
Unclassified report

DESCRIPTORS: *Glaciers, *Ice. Plastic flow, Creep, Shear stresses, Rock.

Nye's theory of the equilibrium surface profile of a two-dimensional ice sheet lying on a horizontal bed is modified to include the effect of the presence of a longitudinal stress. It is shown from two sample calculations that for a large ice cap, Nye's theory is satisfactory; for a small ice cap (of the order of 30 km in width) it is important to include the longitudinal stress. (Author)

AD-277 543 Div. 2
(TISTP/FR) OTS price $2.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
THE FROST BEHAVIOR OF SOILS: LABORATORY AND FIELD DATA FOR A NEW CONCEPT. PART I: VERTICAL SORTING,
by Arturo E. Corte. July 61, 22p. incl. illus. tables, refs. (Research rept. no. 85)
Unclassified report

DESCRIPTORS: *Soils. Freezing, Melting, Mechanical properties, Particles, Rock.

Samples of well-graded, sandy gravels were subjected to alternate freezing and thawing cycles under complete saturation and without surcharges. The results indicate that there is a tendency for a heterogeneous mixture of grains to become vertically sorted (fine particles move downward, coarse ones move upward) under repeated freeze-thaw action, when adequate moisture is present, thereby increasing the volume of the mixture. Changes in volume produced by the freeze-thaw cycles are functions of the heterogeneity of the grains in the soil. Results of field studies in the active layer in the Thule area (N.W. Greenland) tend to confirm these preliminary laboratory findings. (Author)

AD-277 564 Div. 2
(TISTP/JW) OTS price $9.60

McGill U. (Canada).
AN ATLAS OF STRATOSPHERIC CIRCULATION APRIL 1959-

AD-277 740 Div. 2, 4, 25
(TISTM/REB) OTS price $3.60

Noyes Chemical Lab., U. of Illinois, Urbana.
A NUCLEAR MAGNETIC RESONANCE DETERMINATION OF THE HYDROGEN POSITIONS IN Ca(OH)2,
by D. M. Henderson and H. S. Gutowsky.
2 Apr 62, 31p. incl. illus. tables, refs.
(Technical rept. no. 50)
(Contract Nonr-183413, Proj. NR 051-215)
Unclassified report

Presented at the 1956 annual meeting of the Mineralogical Society of America, Minneapolis.

DESCRIPTORS: *Calcium compounds, *Hydroxides, *Hydrogen - Determination, *Crystal structure - Nuclear magnetic resonance. Crystals, Minerals.

A nuclear magnetic resonance (nmr) investigation was carried out on Ca(OH)2, a representative trioctahedral layer hydroxide, for which the proton magnetic resonance absorption was observed in crystal powders at liquid N and at room temperatures. The broadening of the nmr absorption line by interactions among the magnetic nuclei can be measured as the second moment. A particular structural model can be tested by calculating the second moment for it and comparing the result with the experimental value. Measurement of the second moment for a crystal powder enables one structural parameter to be determined. The Bernal-Megaw model was assumed for the position of H in trioctahedral layer hydroxides; the parameter dealt with was a separation distance p which determines the amount of pucker in the hexagonal nets of H nuclei. The experimental values obtained for the second moment are 12.4 ± 0.3 and 10.6 ± 0.7 sq gauss at liquid N and room temperatures, respectively. The hydrogen positions obtained from the low-temperature data are given by p = 0.62 ± 0.04A, which corresponds to Z sub H = 0.437 ± 0.004 and an O-H distance of 0.99 ± 0.02A. These results are compared with related x-ray, neutron diffraction and IR studies of Ca(OH)2 and an nmr study of brucite. (Author)

AD-277 750 Div. 2
(TISTP/FR) OTS price $13.50

Stanford Research Inst., Menlo Park, Calif.
GEOPHYSICAL EXPERIMENTS PERTINENT TO NUCLEAR BLACKOUT STUDIES.
Final rept.,
by I. G. Poppoff, T. O. Passell and others.
31 Dec 61, 185p. incl. illus. tables, refs.
(DASA-1272) Unclassified report

DESCRIPTORS: *Ionospheric disturbances, *Geophysics, *Ionosphere, *Ionization. Nuclear explosions, Solar energy, Aurorae, Protons, Electrons, X rays, Gamma rays, Bremsstrahlung.

Aspects of both natural and nuclear weapon radiations are presented. The interaction of these radiations with the upper atmosphere to produce various ionospheric phenomena is considered and the relevant features of ionization events caused by both nuclear weapon tests and solar-terrestrial phenomena are summarized. Potentially rewarding areas of geophysical research are described. Feasible geophysical experiments are suggested and analyzed with respect to the kinds, numbers, and accuracies of measurements that should and could be made as well as the amount of information that could be derived either under ideal circumstances or in the event of partial malfunction of equipment. (Author)

AD-277 801 Div. 2, 25
(TISTP/WH) OTS price $1.60

Western Ontario U. (Canada).
RESEARCH ON GAS SCINTILLATIONS FROM IONISING RADIATIONS.
Final technical rept., 1 June 61-31 May 62,
by R. W. Nicholls. 31 May 62, 16p. incl. tables.
(Grant AF-AFOSR-61-88)
(AFOSR-2935) Unclassified report

DESCRIPTORS: *Molecular spectroscopy, *Astrophysics, *Gas ionization. Plasma physics, Electron transitions, Ion beams.

The experimental and theoretical research performed during the grant year is reviewed. Studies were made on: Intensity Measurements of Molecular Spectra; Identification Atlas of Molecular Spectra; Ion Beam Spectroscopy, Plasma-Jet Spectroscopy; Corona Spectroscopy; Molecular Potentials; Vibrational Wave Functions; Franck-Condon Factors; r-Centroids; Vibrational-Rotation Interaction; and Atomic Collisions. (Author)

AD-277 847 Div. 2
(TISTP/FR) OTS price $12.50

McGill U. (Canada).
THE STRATOSPHERIC TEMPERATURE FIELD AT HIGH LATITUDES, 100-MB DATA, 1949-1959 WINTERS,
by C. V. Wilson and W. L. Godson. Feb 62,
191p. incl. illus. tables, 32 refs.
(Scientific rept. no. 2; Publication in Meteorology no. 46)
(Contract AF 19(604)8431)
(AFCRL 62-491)
Unclassified report

DESCRIPTORS: *Stratosphere, *Meteorological charts. Northern hemisphere, Temperature.

A series of 100-mb temperature maps were drawn for the winter 1949-50 to 1958-59 using ten-day mean date. These maps were used to summarize the large-scale events of each winter and of the ten winters in general. The results suggest the existence of two major patterns: an asymmetric pattern with a warm ridge over east Siberia-Alaska and an elliptical cold-core vortex over Eurasia; and an eccentric bi-polar distribution, the trough line extending from central Canada to central Siberia. The striking asymmetry of both patterns in the stable stratosphere appears to require an external forcing agent and this analysis tends to highlight the role of tropospheric activity. (Author)

AD-277 902 Div. 2
(TISTP/FR) OTS price $9.10

Wisconsin U., Madison.
AN OBJECTIVE PRECIPITATION CLIMATOLOGY OF CANADA,
by Michael E. Sabbagh and Reid A. Bryson.
Apr 62, 1v. incl. illus. tables, 21 refs.
(Technical rept. no. 8)
(Contract Nonr-120207)
Unclassified report

DESCRIPTORS: *Precipitation, Canada, Periodic variations, Harmonic analysis.

The seasonal and regional distribution of precipitation over Canada is presented by means of variance components or harmonics. Precipitation regimes are identified and characterized. Certain significant features of the annual march of precipitation are explained in terms of the atmospheric circulation. Associations between precipitation patterns and natural vegetation and water bodies are investigated. (Author)

sensitive to high frequent oscillations and occurring in equations other than the equations of motion. Considering linearized versions of the hydrodynamic equations, including different types of noise waves, it is shown, that by the above assumptions sound waves, external and internal gravitational waves can be excluded, but that the slower propagating waves are conserved with a higher accuracy than when using the well-known filters considering geostrophic or balanced motions or hydrostatic equilibrium. (Author)

AD-277 716 Div. 2, 15
(TISTP/WH) OTS price $1.10

Deutscher Wetterdienst, Frankfurt (Germany).
EXPERIMENTS WITH THE UNFILTERED 5-LAYER MODEL,
by W. Edelmann and H. Reiser. 31 Dec 61, 5p. 1 ref. (Technical note no. 3)
(Contract AF 61(052)373)
(AFCRL 62-659) Unclassified report

DESCRIPTORS: *Atmosphere models, *Weather forecasting. Numerical methods and procedures, Differential equations.

AD-277 717 Div. 2
(TISTP/FR) OTS price $2.60

Imperial Coll. of Science and Tech., London (Gt. Brit.).
THE DENSITY AND STRUCTURE OF HAILSTONES,
by K. A. Browning, F. H. Ludlam, and W. C. Macklin. Dec 61, 23p. incl. illus. 17 refs.
(Technical (Scientific) note no. 10)
(Contract AF 61(052)254, Proj. 8620)
(AFCRL-1077) Unclassified report

DESCRIPTORS: *Hail, Density, Clouds, Convection.

Macklin's (1962) experimental study of ice accretions and estimates of the typical conditions in the cumulonimbus of cold air masses and of summer continental air masses are used to deduce the density of ice in the hailstones produced by these clouds. It is shown that generally small hail has a low density; it may reach the ground in the cold air masses but melts into rain in summer conditions. Large hail may have a low density core if grown upon a small frozen cloud droplet, but otherwise always has a high density. The presence of alternate layers of cloudy and clear ice is attributed to transitions between dry and wet growth. Large hailstones can be grown during a slow second ascent in a steady updraught whose speed increases with height. (Author)

AD-277 724 Div. 2, 24
(TISTA/VGW) OTS price $8.60

Manchester U. (Gt. Brit.).
PROCEEDINGS OF A CONFERENCE ON PROBLEMS OF LUNAR TOPOGRAPHY, HELD AT BAGNERES-DE-BIGORRE BETWEEN APRIL 19TH AND 23RD, 1960,
ed. by Zdenek Kopal and Ellen B. Finlay. May 61, 96p. incl. illus. tables (Technical scientific note no. 1)
(Contract AF 61(052)400)
(AFCRL 62-645) Unclassified report

DESCRIPTORS: *Moon - Mapping, *Conferences. Cratering, Surface properties, Height finding, Astronomical data.

Consideration was given to some basic problems of lunar surface mapping encountered in connection with the current charting of the Moon by the U. S. Air Force. As a result of the discussions, it was recommended (1) to reduce anew all past heliometric observations of the crater Mosting A by a standard procedure which should improve our present knowledge of the libration constants of the Moon; (2) to set up, on the Moon, a system of 100-200 control points of second-order, defined by the positions of small craters (5-10 kms in diameter) which are sufficiently shallow and geometrically well-defined to enable us to measure their positions with sufficient accuracy; (3) to employ the lunar plates taken with the Markovitz cameras in the course of the recent IGY to determine the positions of such craters with respect to a fundamental frame of reference as represented by the neighbouring stars, in order to determine their absolute three-dimensional coordinates with respect to the Moon's centre; (4) to use the standard shadow method for the determination of relative heights above the osculating surface of the mean selenoid, between three or more adjacent points of second-order; and (5) to employ purely photometric methods for the mensurement of small gradients for contour maps of the Moon. (Author)

AD-277 726 Div. 2
(TISTA/GEC) OTS price $3.60

Aerospace Information Div., Washington, D. C.
PHENOMENA IN THE UPPER ATMOSPHERE REVIEW OF SOVIET LITERATURE.
Monthly rept. no. 23 for Mar 62.
31 Mar 62, 34p. incl. illus. table, 16 refs.
(AID rept. no. 62-40)
Unclassified report

DESCRIPTORS: *Upper atmosphere - Solar energy, *Ionosphere - Solar energy. Electric currents, Terrestrial magnetism, Van Allen radiation belt, Solar corona, Solar disturbances, Solar flares, Aurorae, Viscosity, Sun spots, Solar atmosphere, Ionization, Mathematical analysis, Ionospheric disturbances, X rays, Solar eclipse, Geophysics, Meteorology, USSR, Earth.

This is the twenty-third in a monthly report series reviewing Soviet developments in selected problems in astrophysics and geophysics. It is based on materials received at the Aerospace Information Division in March. Materials in this report deal with the following topics: Solar radiation and the ionosphere, Telluric currents, and Meteorology of the upper atmosphere. (Author)

AD-277 735 Div. 2
(TISTP/FR) OTS price $1.60

Norwegian Defence Research Establishment.
AURORAL LUMINOSITY AND ABSORPTION OF COSMIC RADIO NOISE,
by O. Holt and A. Omholt. Jan 62, 12p. incl. illus. (Technical note no. 2; Technical note T-74)
(Contract AF 61(052)526)
(AFCRL 62-382) Unclassified report

DESCRIPTORS: *Aurorae, *Extraterrestrial radio waves, *Ionosphere. Brightness, Absorption, Measurement, Statistical analysis.

Riometer measurements of absorption of 27.6 MHz radio waves and simultaneous measurements of the auroral intensity in the zenith have been compared. There is a reasonably good correlation between the two sets of observations. It appears to be a time delay between outbursts of aurora and the increase in absorption. This time delay is usually a few minutes, in good agreement with current information on the recombination coefficients and electron densities. Occasionally the time delay is very short (less than one minute). This appears to be associated with short bursts of strong aurora. (Author)

ods, Theory, Pyrolysis, Nitrogen compounds, Heterocyclic compounds, Fluorocarbons, Boron compounds, Monocyclic compounds, Refractory materials.

Research was undertaken to determine the reliability of the method developed for the microanalytical determination of N by a modified Dumas procedure. Realistic estimates of the precision obtained by using the modified tube filling and an 800 C combustion were established by statistically analyzing measurements made on standard reference compounds on different days by three analysts using two sets of apparatus. Use of the Ni oxide-Cu-Cu oxide tube filling with a 900 C pyrolysis temperature has provided a method that is relatively simple and uses conventional laboratory equipment of moderate cost and low-maintenance requirements. This modified method has excellent precision and gives accurate results on both tractable and refractory compounds. The standard deviation of the differences between theoretical and observed values for 90 compounds of established purity and known nitrogen content is 0.091%. (Author)

AD-277 751 Div. 4, 25
(TISTM/REB) OTS price $11.00

Texaco Experiment, Inc., Richmond, Va.
KINETICS OF CONDENSATION FROM THE VAPOR PHASE.
Annual summary rept. for period ending 15 Apr 62, by Welby G. Courtney. 15 July 62, 139p. incl. illus. tables, 54 refs. (Rept. no. EXP 328; Rept. no. TM-1340)
(Contract Nonr-314100)
Unclassified report

DESCRIPTORS: *Condensation, *Vapors. Thermodynamics, Rocket motor nozzles, Crystallization, Particles, Drops, Theory, Reaction kinetics, Nozzles.

A theoretical and experimental investigation was made of the kinetics and mechanisms of condensation and particularly of homogeneous nucleation from the vapor phase. A brief review is given of the non-steady-state and steady-state theories of homogeneous nucleation and of particle growth from a simple vapor system containing only monomer molecules. New theoretical treatments for the rates of nucleation from a monomer-dimer mixture and from a generalized complex vapor system containing monomer, polymer, and a variety of chemical species were developed. The complex system should particularly apply to condensation in rocket nozzles. A theoretical treatment of the rate of simple condensation under non-isothermal constant-volume conditions was developed and solved on a computer for the condensation of water under typical conditions encountered in a cloud chamber or wind tunnel. A semi-quantitative theoretical insight into condensation in a nozzle was obtained by assuming no condensation and comparing the local residence time along the nozzle to the condensation kinetics predicted by assuming a simple vapor system and non-steady-state or steady-state nucleation kinetics. Reproducible experimental results were obtained in the investigation of the rate of condensation of water from a water vapor-inert gas mixture in a spring-operated cloud chamber. (Author)

AD-277 818 Div. 4
(TISTM/TCG) OTS price $1.10

California U., Berkeley.
THE CHEMISTRY OF RYANODINE.
Final rept., Apr 59-Aug 61, by Henry Rapoport. 1 Mar 62, 9p.
(Contract DA 18-108-405-cml-188)
Unclassified report

DESCRIPTORS: *Ryanodine, *Alkaloids. Hydrolysis, Dehydrogenation, Oxidation, Phosphorus, Hydrogen compounds, Iodides, Purification, Chromatographic analysis, Chemical reactions, Molecular structure, Chemistry, Chemical properties.

Structure studies were carried out on ryanodine, an alkaloid which causes irreversible muscle contraction. Hydrolysis gives ryanodol and 2-pyrrolecarboxylic acid. Ryanodol was oxidized by periodic acid to give a crystalline, three-mole oxidation product. Ryanodol also was reduced by P and HI to a crystalline, benzenoid gamma-lactone. Aromatization studies on these products yielded a series of naphthalenes and anthracenes. A number of 2-pyrrolecarboxylic esters were prepared from 2-pyrrolecarboxylic acid chloride and the corresponding alcohol. (Author)

AD-277 906 Div. 4, 25
(TISTM/TCG) OTS price $.75

Brussels U. (Belgium).
VAPORIZATION OF COMPOUNDS AND ALLOYS AT HIGH TEMPERATURE. PART VII. THERMODYNAMIC STUDY OF TIN AND LEAD SULFIDE USING A MASS SPECTROMETER.
Final rept., Mar 61-Mar 62 on Refractory Inorganic Non-Metallic Materials, by Reginald Colin and John Drowart. Apr 62, 20p. incl. tables, 50 refs.
(Contract AF 61(052)225, Proj. 7350)
(WADD TR 60-782, pt. 7)
Unclassified report

DESCRIPTORS: *Tin compounds, *Lead compounds, *Sulfides, *Thermodynamics - Enthalpy. Vaporization, Vapors, Vapor pressure, Sublimation, Dissociation, Ionization, Mass spectrometers, Chemical reactions, High temperature research.

Reaction enthalpies, delta H sub 298, in kcal/mole, determined were SnS(s) yields SnS(g): 52.6 ± 1.6 kcal/mole; 2 SnS(s) yields Sn2S2(g): 56.5 ± 5.0; PbS(s) yields PbS(g): 55.7 ± 1.6; 2 PbS(s) yields Pb2S2(g): 66.6 ± 5.0; SnPbS2(g) yields SnS(g) + PbS(g): 46.5 ± 5.0; and PbS(g) yields Pb(g) + 1/2 S2(g): 28.8 ± 2.6. (Author)

AD-277 921 Div. 4, 25
(TISTM/EJH) OTS price $3.60

Noyes Chemical Lab., U. of Illinois, Urbana.
VALENCE BOND STUDIES OF THE DEPENDENCE UPON SUBSTITUENTS OF C13-H AND Si29-H COUPLING,
by Cynthia Juan and H. S. Gutowsky. 17 May 62, 36p. incl. illus. tables, 24 refs. (Technical rept. no. 51)
(Contract Nonr-183413)
Unclassified report

DESCRIPTORS: *Chemical bonds, *Methanes, *Ethylenes, *Silanes. Atoms, Hydrogen compounds, Carbon compounds, Silicon compounds, Electrons, Spin, Atomic orbitals, Acetylenes, Hydrocarbons, Halides, Theory, Mathematical analysis, Valence.

An interpretation is presented for the additivity of substituent effects on the C-13-H coupling constant. Each atom of group X is assigned a characteristic affinity for a character in the carbon hybrid orbital of the C-X bond. Distribution of s character among the C orbitals in accord with the relative s affinities of the four substituents leads to the observed additivity relation provided that the total s character is conserved. The valence bond approach used with this model gives a linear relation between the s character of the carbon hybrid orbital involved

AD-277 909 Div. 2, 8
(TISTP/FR) OTS price $3.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
AN EXPERIMENTAL INVESTIGATION OF LUNAR AND AURORAL SCATTERED SIGNALS. PART II. AURORAL ECHOES AT 915 MC.
Final rept.,
by H. A. von Biel. Apr 62, 25p. incl. illus.
(Rept. no. CM-1393-P-7, pt. 2)
(Contract AF 19(604)6116, Proj. 4603)
(AFCRL 62-78, pt. 2) Unclassified report

DESCRIPTORS: *Aurorae, *Ionosphere, Radio signals, Ultra high frequency, Scattering, Reflection, Analysis, Panoramic scanners, Electrons, Theory.

The results of the preliminary investigation of the characteristics of 915 mc radio signals backscattered by the aurora are presented, and recommendations for further study with a monostatic pulsed radar system are discussed as a possible solution to difficulties inherent in the present mode of operation. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

No Entries

4. CHEMISTRY

AD-277 678 Div. 4
(TISTM/REB) OTS price $4.60

Pennsalt Chemicals Corp., Philadelphia, Pa.
CHEMISTRY AND DIELECTRIC PROPERTIES OF FLUOALUMINATES. I. CHEMISTRY AND PHASE EQUILIBRIA.
by Bert Phillips, C. M. Warshaw and I. Mockrin.
May 62, 36p. incl. illus. tables, 17 refs.
(Technical rept. no. 2)
(Contract Nonr-314200, Proj. NR 356-423)
Unclassified report

DESCRIPTORS: *Aluminates, *Fluorides, *Dielectrics - Materials, Dielectric properties, Synthesis, Phase studies, Chemical equilibrium, Potassium compounds, Aluminum compounds, Rubidium compounds, Stability, Crystal structure.

Using differential thermal analysis, direct observational analysis and the quenching technique, the systems KF-AlF3, KAlF4-RbAlF4, and KAlF4-RbAlF4-KBF4, were studied to establish the stability relations of those tetrafluoaluminates which currently have the greatest potential as new dielectric materials. In the system KF-AlF3, two binary compounds are stable, namely K3AlF6 and KAlF4. The KAlF4 compound has a low-temperature inversion (between -23 and +50 C), below which it is rhombic and above which it is cubic. The stable structure exists up to the ''just congruent'' melting temperature of 546+-1 C. The system KAlF4-RbAlF4 forms a complete solid solution series with a maximum solidus-liquidus interval of 10 C. The presence of as little as 5 mol-% RbAlF4 in the KAlF4 lattice greatly affects the low-temperature inversion, reducing it below the temperature of liquid N. The solubility of KBF4 in KAlF4 and RbAlF4, which is approximately 10 and 18 mol-% respectively, suggests that a ternary solid solution of these tetrafluoaluminates with the tetrafluoborate is possible. (Author)

AD-277 679 Div. 4
(TISTM/REB) OTS price $1.60

Pennsalt Chemicals Corp., Philadelphia, Pa.
CHEMISTRY AND DIELECTRIC PROPERTIES OF FLUOALUMINATES. III. HOT-PRESSING,
by F. D. Loomis, Paul A. Marshall, Jr., and I. Mockrin. May 62, 8p. incl. illus. tables, 5 refs. (Technical rept. no. 4)
(Contract Nonr-314200, Proj. NR 356-423)
Unclassified report

DESCRIPTORS: *Aluminates, *Fluorides, *Dielectrics - Materials, Dielectric properties, Mica, Heat treatment, Metal forming presses, Powder metallurgy, Rubidium compounds, Aluminum compounds, Potassium compounds.

Various fluoaluminate compositions, with and without muscovite mica, were hot-pressed at 40,000 to 65,000 psi at 500 to 575 C. The dependence of electric strength on thickness shown by crystals from melts was also exhibited by the hot-pressings. (Author)

AD-277 687 Div. 4
(TISTM/REB) OTS price $4.60

Pennsalt Chemicals Corp., Philadelphia, Pa.
CHEMISTRY AND DIELECTRIC PROPERTIES OF FLUOALUMINATES. II. DIELECTRIC PROPERTIES,
by P. A. Marshall, Jr. and I. Mockrin. May 62, 42p. incl. illus. tables, 7 refs. (Technical rept. no. 3)
(Contract Nonr-314200, Proj. NR 356-423)
Unclassified report

DESCRIPTORS: *Aluminates, *Fluorides, *Dielectrics - Materials, Dielectric properties, Potassium compounds, Aluminum compounds, Rubidium compounds, Boron compounds, Electrical properties, Mica.

A systematic preliminary evaluation was made of the dielectric properties of tetrafluoaluminates, (KAlF4-RbAlF4 plus a small amount of KBF4), a new system of dielectric materials. Electric strength, which was comparable to that of muscovite mica, was apparently a function not of composition but of thickness of the test specimen. The loss angle varied with composition, with some fluoaluminates close to natural mica with respect to this property. The dielectric constant varied from 6 to 9. Electrical properties were not significantly affected by exposure of fluoaluminates to high humidity conditions. The effects of irradiation and of elevated temperature on the electrical properties were also briefly explored. (Author)

AD-277 692 Div. 4
(TISTM/TCG) OTS price $4.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
METHODS OF MICROANALYSIS. IV. STATISTICAL EVALUATION OF THE DUMAS NITROGEN DETERMINATION,
by Marjorie F. Buckles. Mar 62, 49p. incl. illus. tables, 32 refs. (Rept. no. CRDLR 3111)
Unclassified report

DESCRIPTORS: *Nitrogen, *Microanalysis. Feasibility studies, Quantitative analysis, Chemical analysis, Determination, Test meth-

6. DETECTION

AD-277 557 Div. 6, 30
(TISTW/DLW) OTS price $4.60

Electric Boat Div., General Dynamics Corp., Groton, Conn.
DIGITAL SIMULATION OF A CONFORMAL DIMUS SONAR SYSTEM. PHASE II.
Rept. on Proj. SUBIC,
by Charles R. Arnold. 18 Apr 62, 41p. incl. illus. tables, 6 refs. (Rept. no. U414-61-010)
(Contract Nonr-251200) Unclassified report

DESCRIPTORS: *Sonar - Simulation, *Submarines - Sonar equipment, *Digital computers - Submarine simulators, *Sonar signals - Signal-to-noise ratio, *Bearing finding - Sonar targets, *Data processing systems. Digital systems, Hydrophones, Test methods, Tests, Detection.

Findings are presented of the second phase of a continuing investigation of a conformal DIMUS sonar system by means of digital simulation on an IBM 704 computer. A lobe-comparison technique is used to improve bearing information, and the calculation of two statistical parameters is used to aid in detecting targets. The consistency of the mean values for patterns of various signal-to-noise ratios is investigated for both square-law and linear full-wave detectors. Results indicate that digital techniques are an efficient tool for processing sonar information to detect targets. (Author)

AD-277 748 Div. 6
(TISTW/RD) OTS price $7.60

Sperry Microwave Electronics Co., Clearwater, Fla.
DEVELOPMENT OF C-BAND BEACON FERRITE DUPLEXER.
Final engineering rept., June 60-Feb 62,
by J. G. Clark, J. Brown, and G. R. Harrison.
Apr 62, 67p. incl. illus. 23 refs. (Technical rept. no. 4)
(Contract DA 36-039-sc-85330) Unclassified report

DESCRIPTORS: *Radar duplexers. Miniature electronic equipment, C band, Ferrites, Radar beacons, Standing wave ratios, Waveguide couplers, Waveguides, Transmission lines, Limiters.

A solid state duplexer is described which consists of a coaxial four-port circulator, gyromagnetic coupling limiter, and a high-power coaxial load. This device operates between 5.4 and 5.9 gc at power levels up to 40 kw peak, 40 watts average. The primary goal was the development of a miniaturized device incorporating limiting and preselecting functions. The development of a suitable limiter and high power capabilities of the device, were among the problems encountered. Also described are the investigation of the specific application and development of parametric limiters, subsidiary resonance limiters and tunable circulators. (Author)

AD-277 903 Div. 6
(TISTW/DLW) OTS price $3.60

Cornell U., Ithaca, N. Y.
SOME CHARACTERISTICS OF RADAR ANGEL ECHOES,
by N. Vrana. 30 Sep 62, 29p. incl. illus. tables, 7 refs. (Research rept. no. RS 32; Scientific rept. no. 1)
(Contract AF 19(604)6160, Proj. no. 8622)
(AFCRL 62-462) Unclassified report

DESCRIPTORS: *Radar reflections - Atmosphere, *Radar targets, *Radar echo areas - Radar images, *Radar interference - Photographic recording systems. Identification, Target recognition, Motion picture photography, Electromagnetic theory, Test methods, Tests, Velocity.

Time lapse motion picture data was taken of AN/TPQ-11 A-scope radar response to invisible targets commonly referred to in the literature as angels. The information obtained permitted an evaluation of the peak power returned, the cross section of the radar target, the time during which the target intercepted the radar beam, and the apparent velocity of the target. The information recorded over a two-day period indicated that the echo characteristics are capable of being segregated and are reasonably consistent within each of three distinct periods. The nature of the information available from these data reveals some of the detailed manifestations of angel activity and suggest the possibility of learning more about this phenomenon so that its cause and origin may eventually be more clearly understood and predicted. (Author)

7. ELECTRICAL EQUIPMENT

AD-277 555 Div. 7, 12
(TISTA/SEB) OTS price $3.00

General Electric Co., Philadelphia, Pa.
SOLAR THERMIONIC ELECTRICAL POWER SYSTEM.
Final rept., June 60-Oct 61,
by D. L. Cuthbert, D. L. Purdy and others.
Apr 62, 148p. incl. illus. tables, 4 refs.
(Contract AF 33(616)7008, Proj. 3145)
(ASD TDR-62-94) Unclassified report

DESCRIPTORS: *Thermoelectricity - Thermionic emission, *Electric power production - Solar energy. Power supplies, Design, Satellite vehicles, Spaceships, Generators, Tests, Effectiveness.

This is the final report covering the design and development of a solar thermionic electrical power system (STEPS). The design objective was to size the system to generate 500 watts of electrical power in space when operating in a simulated orbit over a 35-minute-dark, 55-minute-light cycle. Vacuum thermionic converters were used. The system was to be ground-operated with the hardware as close to flight type as possible. Details of the design, development, fabrication, and performance of the system are included. (Author)

AD-277 586 Div. 7, 12
(TISTA/VGW) OTS price $2.75

Westinghouse Electric Corp., Baltimore, Md.
PHOTOGENERATOR RESEARCH ANALYSIS.
Final technical rept. for Mar 61-Feb 62 on Solar Energy Conversion,
by I. Limansky, A. S. Jensen, and E. F. Wood.
Apr 62, 118p. incl. illus. tables, 36 refs.
(Contract AF 33(616)7910, Proj. 8173)
(ASD TDR 62-213) Unclassified report

DESCRIPTORS: *Solar cells - Photoelectric cells, *Solar energy - Electric power production, *Spaceships - Auxiliary power plants. Design, Mathematical analysis, Effectiveness, Tests, Photoemission.

in the C-H bond and the observed C-13-H coupling constant. Also, it allows the determination of the s character of the other C orbitals. The dependence of the s character of the C-X bond on the electronegativity of X is discussed in terms of electron spin and charge correlation. The treatment developed for methanes was extended to the coupling constant in substituted ethylenes and to the Si-29-H coupling in silanes. (Author)

AD-277 947 Div. 4
(TISTM/TCG) OTS price $1.60

Southampton U. (Gt. Brit.).
A STUDY OF THE EFFECT OF SUBSTITUENTS AND OF SOLVENT ON THE REACTIVITY OF THE NORMAL AND ABNORMAL POSITIONS OF UNSYMMETRICAL ORGANIC EPOXIDES.
Final technical rept., 1 May 61-30 Apr 62, by R. E. Parker. 20 May 62, 17p. incl. tables, 16 refs.
(Contract DA 91-591-EUC-1736)
Unclassified report

DESCRIPTORS: *Organic compounds - Chemical reactions, *Epoxides, *Reaction kinetics, *Styrenes, *Amines. Benzyl radicals, Oxides, Substitution reactions, Methyl radicals, Chloryl radicals, Solvent action, Ethanols, Methanols, Alcohols, Dielectric properties, Hydrogen, Chemical bonds, Stereochemistry.

The effects of substituents and solvents on the reaction between styrene oxide and benzylamine were investigated. The rate measurements on the reactions of 6 substituted styrene oxides with benzylamine were made in ethanol and methanol. Application of the Hammett equation shows that, as in ethanol, rho is positive for the normal reaction and negative for the abnormal reaction. The effect of substituents in the benzylamine molecule was determined by a kinetic study of the reactions of m-chloro- and 3,4-dimethyl-benzylamine with styrene oxide in ethanol at 3 temperatures. The results supported the similarity between the mechanisms for the normal and abnormal reactions. A kinetic study of the reactions of alpha-methyl-, trans-beta-methyl-, and o-methyl-styrene oxide with benzylamine in ethanol showed that the beta-methyl group reduces the rate of attack at both positions very considerably, while the alpha-methyl group reduces the rate of normal attack slightly and that of abnormal attack considerably, and the o-methyl group has surprisingly little effect of the rate of attack at either position. (Author)

5. COMMUNICATIONS

AD-277 558 Div. 5, 6
(TISTW/RD) OTS price $21.00

HRB-Singer, Inc., State College, Pa.
A SURVEY OF INTERFERENCE REDUCTION TECHNIQUES. VOLUME I. COMMUNICATIONS AND RADAR,
by A. M. Brogdon, J. C. Cook, and C. F. Douds.
15 June 62, 351p. incl. illus. tables, refs.
(Rept. no. 289.3F, vol. 1)
(Contract AF 30(602)2445)
(RADC TDR 62-84, vol. 1)
Unclassified report

DESCRIPTORS: *Radio interference, *Radar interference. Reduction, Search radar, Communication equipment, Radar equipment, Radar transmitters, Radar antennas, Shielding, Magnetrons, Klystrons, Signal-to-noise ratio, Noise (Radar), Noise (Radio), Traveling wave tubes, Radiofrequency filters.

Fundamental concepts of interference reduction for communications and radar transmitters and receivers are presented. Consideration is given to interference suppression in communications transmitters and high power radar transmitters. The problem of properly specifying high-power microwave filters is given particular attention. Shielding design is summarized with formulas and tables. Interference control at the antenna in terms of siting and suppression techniques involving the antenna is presented. A survey of specific design criteria and circuit techniques for each stage of AM, FM, and SSB receivers is given detailed treatment. Operational techniques for interference reduction and interference implications of new systems are briefly discussed. Volume II (classified) considers signal processing techniques used for interference reduction in the radar receiver. (Author)

AD-277 652 Div. 5, 6, 8, 25
(TISTE/CDM) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HIGH-SPEED COMBINED CAMERA TUBE,
by G. M. Khoryak. 16 May 62, 15p. incl. illus. tables (Trans. no. FTD-TT-62-574 from Tekhnika Kino I Televideniya, no. 10:pp 51-56, 1961)
Unclassified report

DESCRIPTORS: *Camera tubes, *Iconoscopes, *Electron optics, *Phototubes. Sensitivity, Mathematical analysis, USSR, Photosensitivity, Signal-to-noise ratio, Television equipment, Detection, Electron tubes.

A study was made of a high-speed combined camera tube. The feasibility of an ideal camera tube is indicated. Installation of an electronic-optical converter and combined tube is considered. The conclusion of threshold illuminance of a combined tube indicated, on the basis of sensitivity, that a combined tube is closer to ideal. (Author)

AD-277 848 Div. 5
(TISTP/FR) OTS price $4.60

Aeronutronic, Newport Beach, Calif.
OPERATIONS CENTRAL AN/MSQ-19 ( ).
Quarterly progress rept. no. 10, 1 Feb-30 Apr 62, 10 May 62, 1v. incl. illus. tables (Publication no. U-1690)
(Contract DA 36-039-sc-75084)
Unclassified report

DESCRIPTORS: *Combat information centers, *Data processing systems, *Display systems, Communication equipment, Army operations.

In systems engineering, primary effort has centered upon the assembly and test of an AN/MSQ-19 system consisting of one item of each major unit. In programming and applications, a system utilizing situation material from exercise LUCKY ECHO was completed and tested. In display equipment, the Overlay Generator and Console Display units were integrated into system tests. Problems uncovered during test of the Overlay Generator have been corrected or are being corrected. In data processing equipment, GRAPHDEN No. 1 and the Overlay Generator Controls No. 1 were completed and integrated into the system tests. In the area of housing and transportation, work continued on the Screening Annex van, the Communications Service Center van, and the Maintenance van. All remaining major procurements for housing and transportation items were completed. (Author)

Space flight, Electrolytes, Seals, Feasibility studies, Thermodynamics, Tests, Effectiveness.

A stack of potassium-mercury liquid metal cells is being constructed to demonstrate the feasibility of the liquid metal cell as a source of future space power. Substantial progress was made in the study and operation of potassium-mercury cells and in pointing up problem areas requiring solution. Four different types of cells were operated successfully, extending cell life to a maximum of 550 hours. Thermodynamic feasibility has been proved. (Author)

AD-277 753 Div. 7, 11, 25
(TISTE/CDM) OTS price $7.60

Research Labs. for the Engineering Sciences, U. of Virginia, Charlottesville.
RESEARCH INVESTIGATION OF MAGNETIC AND ELECTRIC FORCES FOR ROTATING SHAFT SUSPENSION.
Technical progress rept., Mar-May 62,
by B. J. Gilpin. June 62, 74p. incl. illus. tables, 6 refs. (Rept. no. EMI-4454-103-62U)
(Contract AF 33(657)8352, Proj. 3145)
Unclassified report

DESCRIPTORS: *Servo systems, *Bearings, *Electromagnets, *Armatures - Suspension bands, *Magnetic materials - High temperature research, *Electric machinery. Design, Tests, Mathematical analysis, Magnetism, Magnetic cores, Measurement, Electrical equipment, Rotation.

Efforts were made to achieve a noncontacting bearing system for the armatures of rotating electrical machinery by means of magnetic forces. A bearing system was previously designed in which the radial position of the shaft was maintained by passive magnetic fields. To continue this work two rotors were built and tested. The best result gave a ratio of axial to radial force gradient of about 7 to 1. Fast electromagnets were built, and tested. Several materials were compared. Satisfactory results are expected from the axial positioning servo system with only current feedback in the amplifiers. In extending the effort, preliminary considerations of three radially active magnetic systems are given: (1) a permanent magnet rotor type, (2) a local acting iron rotor type, and (3) a magnetic resonant type. Also, the basic calculations for a resonant electric system are given. (Author)

AD-277 805 Div. 7, 14
(TISTM/BRW) OTS price $2.75

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
REGENERATIVE FUEL CELL SYSTEM.
Final rept.,
by H. J. Schwartz, S. S. Carlton, and J. M. Fuscoe. Apr 62, 125p. incl. illus. tables, 17 refs. (Rept. no. ER-4692)
(Contract AF 33(600)39573, Proj. 3145)
(ASD TDR 62-18) Unclassified report

DESCRIPTORS: *Fuel cells - Design, *Electrolytic cells. Thermochemistry, Materials, Electrodes, Electrolytes, Hydrogen, Lithium, Anodes (Electrolytic cell), Battery separators, Weightlessness, Electrical properties, Tests, Electrochemistry, Construction, Diffusion.

This report covers the second phase of an applied research program leading to the design and testing of a thermally regenerative fuel cell system. The program effort in this phase has been concentrated on the design and testing of three-cell lithium-hydrogen regenerative fuel cell model system. In support of the development of an operating system, investigations were carried out to determine the compatibility of various materials of construction with the system fluids and to investigate the diffusion rate of hydrogen through potential electrode materials. These led to the development of a combination anode-separator capable of operation in a zero gravity environment, and to indications of materials and techniques suitable for producing a high current density diffusion electrode. Components for a three-cell model system were designed, built and tested. The system was assembled but was not operated for lack of a suitable fluid pump. (Author)

AD-277 940 Div. 7, 25, 12, 8
(TISTE/CAM) OTS price $3.60

RCA Industrial Tube Products, Lancaster, Pa.
THE DEVELOPMENT OF AN AUXILIARY ELECTRODE THERMIONIC CONVERTER.
Quarterly technical rept. no. 2, 15 Mar-15 June 62,
by F. G. Block and J. J. O'Grady. July 62, 35p. incl. illus. tables.
(Contract AF 33(657)8005, Proj. 3145)
Unclassified report

DESCRIPTORS: *Electric power production, *Generators, *Thermionic emission, *Satellite vehicles. Electrodes, Cathodes, Heat, Ions, Particle accelerators, Plasma physics, Materials, Cesium, Gases, Chemical impurities, Theory, Feasibility studies, Test equipment, Tests.

The feasibility and development program for the three-electrode thermionic converter was continued. Evaluations of several new geometries and processes were made with particular emphasis on the improvement of cesium purity. This last investigation produced impressive results in raising the power density and efficiency of the converters and achieving a more uniform product with which to evaluate changes in design. The over-all design of the Six-Volt Generator was determined. This design is being translated into component prints and assemblies and orders have been placed for the fabrication of the initial parts. Material investigations were performed at the three temperatures of interest. The program requires a 1000-hour test. This limitation resulted in a few evaluations of material compatibility with cesium. However, more samples are presently under test and the analyses will be reported following the completion of the tests. (Author)

Division 7 - ELECTRICAL EQUIPMENT

This program encompassed a theoretical study of the parameters affecting the efficiency of photoemissive solar energy converters with a view toward evolving design concepts for obtaining maximum efficiency from photoemissive converters for space application. As a result, conceptual designs ranging in efficiency from 0.7 to 4.1 percent were developed and many of the problems involved in attaining these high figures were defined. These conceptual designs assume the use of presently available surfaces and fabrication techniques. The converter with 0.7 percent efficiency is one in which a photocathode having an S-11 surface is used with an anode having an S-1 surface. The converter with 4.1-percent efficiency uses optimum surfaces with emitter and collector of different surfaces and includes two photoemitting surfaces and one collecting surface. One of the emitting surfaces is assumed to be on a reflecting substrate. Literature search, laboratory converter experiments, and an electron optical analysis involving the use of Teledeltos paper for forming equipotential plots were used. (Author)

AD-277 616 Div. 7, 4
(TISTM/REB) OTS price $3.60

Armour Research Foundation, Chicago, Ill.
CHEMICAL CONVERSION OF WASTE HEAT TO ELECTRICAL ENERGY.
Quarterly rept. no. 6, 1 Oct-31 Dec 61,
by C. Roland McCully. 28 May 62, 27p. incl. illus. tables (Rept. no. ARF 3182-7)
(Contract NOw 60-0760-c)
Unclassified report

DESCRIPTORS: *Primary batteries, *Electrolytic cells, *Power supplies, *Electricity. Chemical reactions, Tellurium, Tellurium compounds, Copper compounds, Chlorides, Antimony compounds, Aluminum compounds, Heat, Anodes (Electrolytic cell), Cathodes (Electrolytic cell), Pyrolysis, Melting, Vapor pressure, Corrosion.

Chemical and electrochemical reactions are being studied for converting heat to electrical energy. Current work is devoted to the production of breadboard models of two systems. One complete system, based on chlorides of Sb, has been operated on a very small scale. Attributes of this system are simplicity of thermal regeneration, an operating temperature range between 300 and 600 K, conversion efficiencies above 15%, and moderate power density. The higher power densities were computed for a system based on chlorides of Te and Cu. Stepwise operation of all phases has been accomplished. This system has highly favorable galvanic cell characteristics, but regeneration is more difficult than for the Sb chlorides. Supporting studies reported include thermal decomposition of $TeCl_4$ and of $SbCl_5$, vapor pressure of melts of $AlCl_3$ with $CuCl_2$ and with CuCl, and corrosion studies in $SbCl_5$. (Author)

AD-277 675 Div. 7, 8, 26
(TISTE/CAM) OTS price $3.60

International Resistance Co., Philadelphia, Pa.
RESISTORS, FIXED FILM TYPE GENERAL PURPOSE.
Quarterly progress rept. no. 11, 1 Jan-31 Mar 62, by Jerome G. Burns. 31 Mar 62, 31p. incl. tables.
(Contract DA 36-039-sc-81283)
Unclassified report

DESCRIPTORS: *Fixed resistors - Production, *Resistors, *Manufacturing methods. Films, Carbon alloys, Coatings, Molding, Molding materials, Processing, Materials, Tests, Reliability, Life expectancy, Thin films, Protective coverings, High temperature research.

An experiment was run to evaluate the effect of the protective carbon alloy coating upon performance of molded units. Four ranges were tested for 500 hrs at 175 C no load. The results indicate that this coating is effective in improving 175 C no load performance in the higher ranges only. However, the application of this coating causes very high and unpredictable changes in initial resistance which invalidates its use for production. Subassemblies were sprayed with a thin Teflon coating prior to molding to isolate possible mechanical effect of the mold jacket. Four ranges were tested at 175 C no load, 100 C load life and moisture cycle. The results indicated that the Teflon coating had no affect upon performance. Pre-production testing was completed for the RC-20 size in all ranges. Pre-production testing was completed for 3 ranges of the RC-07 style. The approximate nominal resistance values are 500, 1000, and 5000 ohms. All tests were passed successfully. (Author)

AD-277 688 Div. 7, 8, 26
(TISTE/CDM) OTS price $8.10

RCA Defense Electronic Products, Camden, N. J.
DEVELOPMENT OF MICROELEMENT TRIMMER CAPACITORS.
Formal engineering rept. on Micro-Module Production Program.
15 June 62, 96p. incl. illus. tables.
(Contract DA 36-039-sc-75968)
Unclassified report

DESCRIPTORS: *Variable capacitors, *Ceramic capacitors, *Microminiaturization (Electronics), *Manufacturing methods. Design, Production, Tests, Feasibility studies, Reliability, Costs, Test equipment.

Work was conducted on the design and production of trimmer capacitors for use in micro-modules. Trimmer capacitors in microelement form factor in three ranges of capacitance were produced. Tests proved that the basic design was at least equal in performance to conventional components. When the microelement trimmer capacitors were assembled in circuit modules, the modules successfully met all circuit requirements. Nominal capacitance ranges of 1.5 to 5 pf, 3 to 10 pf, and 2 to 18 pf were achieved. More than 750 final-grade elements were fabricated and tested. The tests showed that the basic design of the trimmer capacitors engendered high reliability, and was suitable for use in all of the specified applications. Because the trimmer capacitor would contain moving parts, the development of special assembly and encapsulation techniques unique to this microelement type was included in the over-all task objective. These techniques were established and utilized with satisfactory results in the assembly of test and circuit modules. (Author)

AD-277 707 Div. 7, 12
(TISTA/SEB) OTS price $3.60

Allison Div., General Motors Corp.,
Indianapolis, Ind.
DESIGN AND DEVELOPMENT OF A LIQUID METAL CELL.
Quarterly technical progress rept. no. 2,
1 Apr-30 June 62,
by B. Agruss, H. R. Karas, and V. L. Decker.
13 July 62, 33p. incl. illus. table, refs.
(Allison EDR no. 2870)
(Contract AF 33(657)7847, Proj. 8173)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Potassium - Liquid metals, *Mercury - Liquid metals, *Electrolytic cells - Design. Power supplies, Spaceships,

ducted in northern Virginia to determine the suitability of the meter for establishing elevations in the Artillery Survey System 40- by 40-mile area and for other possible Corps of Engineers and Army applications. (Author)

AD-277 556 Div. 8, 25
(TISTE/CAM) OTS price $4.60

General Telephone and Electronics Labs., Inc. Bayside, N. Y.
STUDIES OF ELECTRON TUBE MATERIALS AND THERMIONIC EMISSION PROCESSES.
Scientific rept. no. 8, 1 Jan-31 Mar 62. 31 Mar 62, 41p. incl. illus. table, refs. (Rept. no. TR 62-704-104-204-205-208.17)
(Contract AF 19(604)7286)
(AFCRL 62-373) Unclassified report

DESCRIPTORS: *Thermionic emission, *Oxide cathodes. Cathodes (Electron tubes), Electron tubes, Diodes, Materials, Nickel, Barium, Barium compounds, Oxides, Platinum, Molybdenum, Chemical reactions, Gases, Mass spectroscopy, Temperature, Ions, Molecular beams, Coatings, Sublimation, Evaporation, Thin films, Electron microscopy, Tests, Calibration.

The thermionic emission properties of ultra-pure nickel-base oxide cathodes in the clean test diode are being investigated. A comparison of the emission results for active N4 and ultra-pure nickel-base cathodes shows that the active nickel-base cathodes are well activated after the four high-temperature processing treatments. The sublimation characteristics of a barium oxide platinum-base cathode were studied. The evaporation rates of molecular BaO as measured by the retarding field technique were in excellent agreement with previously reported values based upon mass spectrometric, chemical and radioactive tracer methods. Full operation of the Knudsen cell-mass spectrometer system provided an initial calibration of the instrument. The presence of silver and molecular beam operation was confirmed by a measurement of the isotopic abundance of the ions in question, by the mass scale constants for the instrument and by operation of the molecular beam shutter. The electron emissive properties of a triple oxide cathode were displayed on the screen of a 24-inch diameter sealed-off emission microscope tube. The size and location of emission sites were observed. (Author)

AD-277 561 Div. 8, 12
(TISTE/CDM) OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PHASE SHIFTING TO AVOID INTERFERENCE REGIONS BETWEEN ANTENNA ELEMENTS,
by B. H. Labitt. 23 May 62, 11p. incl. illus. 4 refs. (Rept. no. 42G-2)
(Contract AF 19(604)7400)
(AFESD TDR 62-99) Unclassified report

DESCRIPTORS: *Phase shifters, *Satellite vehicle antennas, *Guided missile antennas, *Antenna radiation patterns - Interference. Manned, Satellite vehicles, Phase modulation, Radar tracking, Mathematical analysis, Telemetering antennas.

The creation of interference regions in satellite or missile borne antenna systems (as in Project Mercury) which utilize multiple radiating elements, has caused erratic and generally poor ground tracking. One method of modifying the above interference regions has been accomplished by modulating the phase of one of the antenna elements with respect to its adjacent element. The effect of such phase modulation is described mathematically and particular values are suggested for angular modulation such that a minimum deviation in transmitted power vs viewing angle to the vehicle is afforded. (Author)

AD-277 581 Div. 8
(TISTE/CDM) OTS price $7.60

Syracuse U. Research Inst., N. Y.
INVESTIGATION OF GROUND ANTENNA CHARACTERISTICS. Final technical rept., 25 Apr 57-31 Jan 62, by David K. Cheng. 1 Feb 62, 74p. incl. illus. tables (Rept. no. EE 492-6202F)
(Contract AF 30(602)1640, Proj. 4506)
(RADC TDR 62-133) Unclassified report

DESCRIPTORS: *Antennas - Analysis, *Coupled antennas, *Dipole antennas, *Helical antennas, *Radar antennas. Search radar, Mathematical analysis, Electromagnetic waves, Lens antennas, Scattering, Dielectrics, Phase shifters, Electric fields, Magnetic fields, Microwaves, Diffraction, Test methods, Tests, Measurement, Lobing, Raindrops, Diodes, Antenna radiation patterns, Transformations (Mathematics), Modulation, Microwave equipment, Theory.

An investigation was made of ground antenna characteristics. A resume is presented for the work done on the following tasks: (1) normal gain and beamwidth of directional antennas, (2) effect of surface reflections on rain cancellation of circularly-polarized radars, (3) study of the scattering of electromagnetic waves by a paraboloid of revolution, (4) a new class of artificial dielectrics, (5) characteristics of counterwound helices, (6) a new mathematical approach for linear array analysis, (7) theoretical study on measurements of microwave electric and magnetic field distributions by modulated scattering methods, (8) optimum progressive phase shifts for discrete endfire arrays, (9) experimental diffraction field measurements by modulated scattering technique, (10) determination of phase-center location by amplitude measurements, (11) side-lobe reduction by nonuniform element spacing, (12) critical study of linear arrays with equal side lobes, and (13) small resonant scatterers and their use for field measurements. (Author)

AD-277 582 Div. 8, 30
(TISTP/JW) OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
COMPUTER SIMULATION ROUTINE FOR RADIO FREQUENCY BACKSCATTER: ANALYSIS FOR COMPUTER GENERATION OF NOISE,
by G. W. Evans II, R. C. McCarty and others. May 62, 12p. incl. illus. 4 refs. (Technical rept. no. 2)
(Contract SD-103)
Unclassified report

DESCRIPTORS: *Noise analyzers, *Signal-to-noise ratio, *Radio waves. Scattering, Computer logic, Simulation, Radiofrequency, Statistical distributions.

The computer simulation is discussed on the amplitude of noise signals which are bounded and are either time dependent or time independent. In the cases considered, it is assumed that there exists a cumulative distribution function for the amplitudes of the noise signal. (Author)

AD-277 583 Div. 8, 25
(TISTP/JW) OTS price $1.60

Electrical Engineering Research Lab., U. of Texas, Austin.
RESEARCH ON MILLIMETER WAVE PROPAGATION AT HIGH

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-277 501 Div. 8
(TISTP/FR) OTS price $5.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE COBI DATA TRANSMISSION MODEM,
by K. H. Morey. 23 May 62, 54p. incl. illus. tables, 9 refs. (Technical rept. no. 263)
(Contract AF 19(604)7400)
(AFESD TDR 62-97) Unclassified report

DESCRIPTORS: *Data transmission systems. Digital systems, Phase modulation, Telephone lines, Tests, Errors, Handbooks.

The COBI (coded biphase) data transmission modem employs phase-reversal modulation and code translation as a means of transmitting serial digital data over voice-bandwidth telephone circuits. The use of phase-reversal modulation gives COBI certain advantages over present amplitude-modulation systems, including the ability to function with lower error rates in the presence of rapid signal-strength fluctuations and larger amounts of Gaussian and impulse noise. Code translation makes it possible to include block-start and bit-timing information in the data stream. A detailed description of COBI and the manner in which it operates is given. Background is provided by a history of data systems leading to COBI, a brief discussion of telephone-circuit characteristics, and a summary of the theory basic to phase-reversal modulation. Also described are the extensive tests to which COBI has been subjected and some of the results. Finally, specifications for a COBI modem, as well as procedures for its alignment and testing, are appended. (Author)

AD-277 511 Div. 8, 15
(TISTP/WH) OTS price $2.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE DERIVATION OF NETWORK FUNCTIONS FROM PHASE FUNCTIONS,
by Sid Deutsch. 6 Mar 62, 14p. illus. 12 refs.
(Research rept. no. PIBMRI-1006-62)
(Contract AF 18(600)1505)
(AFOSR-2406)
Unclassified report

DESCRIPTORS: *Electrical networks, *Circuits, *Phase measurement. Integral equations, Partial differential equations.

Equations are developed for deriving a network function F(s) given its phase function T(w). Several numerical examples are given. In each case, the recurrence of the given T(w) function in F(jw) is a means of checking the accuracy of the derived F(s) function. The real part of log F(jw) yields the log magnitude response, log M(w). The examples indicate that the mathematical operations of finding F(s) are relatively simple. The equations are also employed to evaluate certain definite logarithmic integrals. (Author)

AD-277 513 Div. 8
(TISTP/FR) OTS price $5.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
DESCRIPTION AND MANUAL OF OPERATION FOR ANALOG TO DIGITAL CONVERTER,
by William A. Bellmer. 29 Jan 62, 51p. incl. illus. tables (Research rept. no. PIBMRI 978-61)
(Contract AF 19(604)6154, Proj. 4691)
Unclassified report

DESCRIPTORS: *Analog-to-digital converters, *Digital recording systems, *Punched card methods. Handbooks, Radio receivers, Automatic voltage control, Voltage, Radio interception.

In the study of radio station recognition from signal strength fading characteristics, it has been necessary to provide samples of the fading patterns in a form suitable for use by the IBM 650 computer. The analog to digital converter (ADC) described performs these functions in two steps: (1) the AVC voltage is read automatically at a given sampling rate and the 2-decimal digit values are punched on paper tape in teletype (5 channel) code; and (2) the prepared tape is then placed on an IBM 47-tape-to-card converter, which produces IBM cards in the required format for 650 input. The tape-preparation section of the system consists of a radio receiver (Signal Corps R-390), a digital voltmeter (DVM) with electrical BCD output (Beckman 5350 R, a 5-channel paper-tape punch (IBM 962-E1), and a converter/control unit to convert data to proper punching format and synchronize operations. (Author)

AD-277 515 Div. 8, 26
(TISTW/DLW) OTS price $2.60

Pacific Semiconductors, Inc., Lawndale, Calif.
INTERDIGITATED SILICON TRANSISTOR PROGRAM.
Quarterly interim technical engineering rept. no. 3, 19 Mar-18 June 62,
by B. Rappaport and F. J. Steinebrey. July 62, 19p. illus. ref. (PSI rept. no. 3000:37-3Q)
(Contract AF 33(600)43029)
(ASD TR 7-850, vol. 3)
Unclassified report

DESCRIPTORS: *Transitors - Production, *Manufacturing methods, *Semiconductors, *Transistor amplifiers. Silicon, Power amplifiers, Processing, High frequency, Vapor plating, Packaged circuits, Design.

The 10, 50, and 100 ampere device designs were completed. Some 10 and 20 ampere planar transistors were fabricated, and indications are that by the elimination of all thermal oxidations of the collector surface, the collector-base reverse leakage can be reduced. An electrochemical polishing technique was tried that showed promise. A decision was made to employ a horizontal RF-heated reactor for epitaxial collector deposition, and construction is under way. Some progress was made in the development of a vapor technique for predepositing the base dopant on the wafer. Three package sizes will be required to house all five types of transistors, each utilizing ceramic insulators. Packages will be sealed by cold welding. (Author)

AD-277 548 Div. 8
(TISTP/FR) OTS price $6.60

Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency, Fort Belvoir, Va.
ENGINEERING TEST REPORT; ELEVATION METER, GROUND,
by Duane C. Bright. 22 Mar 62, 66p. incl. illus.
(Technical rept. no. 5-TR)
Unclassified report

DESCRIPTORS: *Height finding. Cargo vehicles, Analog computers.

The development and testing of a ground elevation meter--a four-wheel-drive, four-wheel-steer vehicle equipped with a fifth wheel for measuring distance and a pendulum for determining slope is discussed. The distance and slope information is automatically fed into an electronic computer which integrates the information to provide ground elevations. Engineering tests were con-

ANTENNAS DRIVEN FROM COAXIAL LINES,
by Tai Tsun Wu. 17 Apr 62, 9p. incl. illus.
2 refs. (Technical rept. no. 362)
(Contract Nonr-186632, Proj. NR 371-016)
Unclassified report

DESCRIPTORS: *Dipole antennas, *Transmission lines, *Coaxial cables, Mathematical analysis, Theory, Integral equations, Admittance.

For an infinitely long dipole antenna driven from a coaxial line, the reflection coefficient and hence the apparent terminal admittance are determined approximately when the radii of the coaxial line are small compared with the wavelength. This result is useful because the differences of admittances for antennas with identical geometry near the driving point are less sensitive to the driving condition and hence can be found approximately by many existing theories. (Author)

AD-277 663 Div. 8, 15
(TISTP/WH) OTS price $2.60

Cruft Lab., Harvard U., Cambridge, Mass.
TERMINAL ZONE CORRECTIONS FOR A DIPOLE DRIVEN BY A TWO-WIRE LINE,
by Keigo Iizuka and Ronald W. P. King.
25 Feb 62, 14p. incl. illus. tables, 22 refs.
(Technical rept. no. 352)
(Contract Nonr-186632, Proj. NR 371-016)
Unclassified report

DESCRIPTORS: *Dipole antennas, *Transmission lines, *Excitation. Electrical properties, Inductance, Functions, Integral equations.

The terminal-zone effects on the dipole antenna driven by a two-wire transmission line have been re-examined. A series inductive correction together with other terminal-zone corrections is found necessary to reduce the measured apparent admittance of the antenna terminating the two-wire line with the ideal admittance of the dipole antenna when driven by a delta-function generator. The series inductive correction takes account of the absence of the antenna wire in the gap between the two-wires of the transmission line. With this additional correction, the measured apparent admittance of a dipole antenna may be brought into excellent agreement with theoretical values and also reconciled with the quite different values measured with a coaxial line for an antenna consisting of the vertical inner conductor of the line extended over a horizontal ground plane. (Author)

AD-277 674 Div. 8, 26
(TISTE/CAM) OTS price $1.60

Motorola, Inc., Phoenix, Ariz.
MINIATURE THIN-FILM INDUCTORS.
Interim development rept. no. 4, 1 Mar-1 June 62,
by F. R. Gleason. 1 July 62, 15p. incl. illus. tables (Rept. no. WP-2631-8)
(Contract NObsr-85397)
Unclassified report

DESCRIPTORS: *Radiofrequency coils - Production, *Miniature electronic equipment, *Manufacturing methods. Coils, Inductance, Ferromagnetic materials, Ferrites, Thin films, Metal films, Processing, Temperature, Flame spraying, Chemical analysis, X-ray diffraction analysis, X-ray spectroscopy, Nickel compounds, Zinc compounds, Cobalt compounds, Iron compounds, Oxides, Design.

Work is presented on the fabrication of thin-film inductors on bulk ferrites, and on the deposition of thin ferrite films with a usable permeability and Q-value as measured at 1 mc. The problems concerned with providing recessed areas for fabrication of spiral coils in bulk ferrites for reduction in air-gap effects are discussed. Other factors affecting the air gap are presented and some solutions to the problem are given. An inductance of 150 microhenries and a Q-value of 19 as measured as 1 mc is reported for a particular sample. Ferrite thin-film compositional stoichiometry is reviewed as well as methods for obtaining film composition close to that of a particular bulk ferrite with desirable properties. Methods of analysis are discussed along with a magnetic evaluation of a typical sample. (Author)

AD-277 713 Div. 8, 14, 26, 7
(TISTM/TCG) OTS price $2.60

Ford Instrument Co., Long Island City, N. Y.
LOW TEMPERATURE THERMIONIC CONVERTERS.
Quarterly technical progress rept. no. 2, 1 Mar-1 June 62.
June 62, 11p. illus.
(Contract AF 33(657)7663)
Unclassified report

DESCRIPTORS: *Electron guns - Design, *Thermionic emission, *Power supplies - Production, *Cesium. Materials, Refractory materials, Molybdenum, Molybdenum alloys, Tungsten, Cathodes, Manufacturing methods, Machining, Vacuum systems, Low temperature research, Grains (Metallurgy), Growth, Metal seals, Metals, Ceramic materials, Spaceships.

Improvement was made in the reliability of refractory metal envelopes relative to grain growth and subsequent permeability. An emitter cup of pure Mo was run for 131 hr with no loss in leak tightness. Photomicrograph evidence confirmed that the cup was in excellent condition with considerably reduced grain growth. Processing was expanded to include the more difficult Mo alloys and W; cups were successfully fabricated of these materials. A power density of over 1 w/sq cm was achieved (1210 C) with an opposed Mo cup device even without a full range of parameter optimization. A number of additional devices of improved design are being processed and higher power densities are expected with power maximized temperatures for the cesium bulb, emitter and collector. (Author)

AD-277 722 Div. 8, 26
(TISTE/CAM) OTS price $2.60

Microwave Associates, Inc., Burlington, Mass.
VARACTOR DIODE INDUSTRIAL PREPAREDNESS MEASURES.
Quarterly progress rept. no. 8, 25 Mar-25 June 62.
25 June 62, 14p. illus.
(Contract DA 36-039-sc-85941)
Unclassified report

DESCRIPTORS: *Diodes - Production, *Variable capacitors, *Manufacturing methods - Diodes. Silicon, Aluminum compounds, Oxides, Talc, Ceramic materials, Processing, Packaging, Reliability, Thermal stresses, Electrical properties, Temperature, Vacuum seals, Tests, Microwave equipment.

Efforts were directed toward the establishment of a capability to mass-produce a variable capacitance microwave diode. This diode, known as a varactor diode, is a silicon diffused mesa device. A new and improved reversible cartridge has been designed for it and placed into partial production. Alumina was substituted for steatite in the preparation of the reversible cartridge. The relative merits of alumina ceramic over steatite is discussed in detail. A discussion is given on the metalizing which is applied to the two different types of ceramic, along with the electrical differences between alumina and

ALTITUDES.
Quarterly engineering rept. no. 3, 1 Mar-31 May 62.
31 May 62, 14p. incl. illus.
(Contract AF 33(657)7333)
Unclassified report

DESCRIPTORS: *Microwave spectroscopy, *Microwaves, *Radiometers, *Wave transmission. Reflex klystrons, Atmospheric refraction, High altitude, Absorption, Water vapor, Stratosphere, Attenuation.

Results of absorption cell measurements: attenuation per kilometer through dry air is shown in 11 figures at elevations of sea level through 100,000 ft (at 10,000 ft elevation increments). The attenuation is shown between the frequencies of 58 and 62 kmc as resolved at 100 megacycle increments with the 500-ft absorption cell. The calculated oxygen line center frequencies are shown on the abscissa of each of the figures. The total attenuation vertically between sea level and 100,000 ft is represented by the summation of the attenuation at the 10,000 ft increments of the 11 figures. (Author)

AD-277 584 Div. 8, 5
(TISTE/CDM) OTS price $11.50

Temco Electronics, Dallas, Tex.
ANTENNA COUPLER-QUALITY CHECKER.
Final rept.
10 Feb 62, 146p. incl. illus. tables.
(Contract FAA/BRD-162)
Unclassified report

DESCRIPTORS: *Antenna couplers, *Monitors - Radio equipment, *Radio communication systems. Very high frequency, Ultra high frequency, Radio transmitters, Radio receivers, Measurement, Power supplies, Low pass filters, Voice communication systems, Tests, Quality control, Automatic, Coding.

Effort was made to develop an improved ground radiation system for UHF and VHF voice communications. Development goals were to reduce intermodulation, to reduce the number of antennas needed at any communication site and to provide a reliable means of automatic checking of transmitters and receivers. The transmitter antenna coupler developed will allow four transmitters to operate into one antenna. The antenna coupler uses eight shunt cavities which provide high attenuation between different transmitter inputs and low insertion between any transmitter and the antenna. Two receiver couplers were developed to reduce the number of antennas required for receiving. These couplers allow four receivers to operate from one antenna while maintaining 60 db isolation between receiver inputs. The automatic checking devices consist of a transmitter checker, a VHF receiver checker, and a UHF receiver checker. The transmitter quality checker will provide continuous quality checking of four transmitters to provide fault isolation and automatic switching. An alarm coder-decoder system was designed for use with the checking devices. (Author)

AD-277 596 Div. 8
(TISTE/CDM) OTS price $1.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
WIDEBAND AMPLIFIER USING BTL M2107 MICROWAVE TRANSISTOR,
by George E. Hambleton. Dec 61, 16p. incl. illus. (ASRDL technical rept. no. 2259)
Unclassified report

DESCRIPTORS: *Microwave amplifiers, *Transistor amplifiers - Broadband, *Radiofrequency amplifiers, *Transistors. Germanium, Tests, Measurement.

An evaluation was made of the M2107 microwave transistors (first models) as wideband amplifiers. The transistor unit, bias supply, and test circuits are described. Presented in graph form are power gain and noise figure measurements as a function of frequency. The M2107 is a diffused base PNP germanium transistor, with a mesa structure, designed for use as an amplifier at 3000 mc. Techniques have been refined to permit accurate fabrication with small dimensions, and the unit has been encapsulated in a coaxial package. The M2107 microwave transistor operated as an untuned, wideband amplifier (i.e., amplification of electrical signals at frequencies from zero to 1000 mc). The first available transistor models did not permit useful operation at the design frequencies; however, they were capable of useful application. (Author)

AD-277 642 Div. 8
(TISTA/VGW) OTS price $1.75

Westinghouse Electric Corp., Pittsburgh, Pa.
RESEARCH ON ELECTRON BOMBARDMENT INDUCED CONDUCTIVITY TARGETS IN CAMERA TUBES.
Final rept. for Oct 60-Oct 61 on Electronic Tube Technology,
by J. Lempert and G. Klotzbaugh. Apr 62, 64p. incl. illus. tables, 16 refs.
(Contract AF 33(616)6496, Proj. 4156)
(ASD TR 61-657) Unclassified report

DESCRIPTORS: *Camera tubes, *Electron bombardment, *Photoconductivity. Arsenides, Selenides, Thin films, Surface properties, Secondary emission, Electron beams, Electronic scanners, Mathematical analysis, Tests, Conductivity.

An analysis of scan parameters as they affect the performance of electron bombardment induced conductivity (EBIC) targets is presented. The conclusion is reached that the secondary emission characteristic of the target surface is an extremely important parameter in camera tubes of the photoconductivity and EBIC types. Evidence that the electron absorptivity of the target for low voltage electrons is affected by the degree of induced excitation is presented. Results of an investigation of different EBIC target materials are reviewed. The fabrication of experimental EBIC tubes having electrostatic and magnetic focused image sections is described. Test results are discussed. (Author)

AD-277 656 Div. 8
(TISTP/WH) OTS price $1.60

Cruft Lab., Harvard U., Cambridge, Mass.
THEORY OF THE THIN CIRCULAR LOOP ANTENNA,
by Tai Tsun Wu. 16 Apr 62, 8p. incl. illus. 7 refs. (Technical rept. no. 361)
(Contract Nonr-186632, Proj. NR371-016)
Unclassified report

DESCRIPTORS: *Loop antennas, *Excitation. Fourier analysis, Dipole antennas, Series.

The current distribution on a thin circular loop transmitting antenna driven by a delta-function generator is determined approximately by Fourier series expansion. A difficulty encountered in previous analysis is shown to be due to an inadequate approximation. (Author)

AD-277 657 Div. 8
(TISTE/CDM) OTS price $1.60

Cruft Lab., Harvard U., Cambridge, Mass.
INPUT ADMITTANCE OF INFINITELY LONG DIPOLE

conductors, Transistors, Diodes, Crystals, Materials, Electronic equipment, Digital computers, Memory devices, Electronic circuits, Radio transmitters, Radio receivers, Power supplies, Research program administration, Production, Encapsulation, Life expectancy, Reliability, Tests.

Contents:
Passive parts
  Capacitors
  Resistors
  Inductors
Semiconductor devices
  Transistors
  Diodes
Crystals
Materials and terminations
Micro-modules
AN/PRC-51 radio set (program extension II, equipment)
Micropac computer
  Logic design
  Logic circuits
  Memory design
  Mechanical design
  Breadboard computer fabrication
  Micropac fabrication
  Power supply
  System integration and test
Specifications, standards and reliability

AD-277 840 Div. 8
(TISTB/AW) OTS price $2.25

Lockheed Aircraft Corp., Sunnyvale, Calif.
RADIATION EFFECTS ON ELECTRONIC COMPONENTS: AN ANNOTATED BIBLIOGRAPHY,
comp. by William L. Hollister. Apr 62, 94p.
(Special bibliography no. SB-62-13; Rept. no. 3-88-62-2)
(Contract AF 04(647)840)
Unclassified report

DESCRIPTORS: *Bibliography - Radiation effects, *Radiation effects - Electronic equipment, *Electronic equipment - Radiation effects. Radiation damage, Silicon, Capacitors, Resistors, Semiconductors, Electronic circuits, Germanium, Relays, Gamma rays, Dielectrics, Diodes, Transistors, Transformers, Rectifiers.

This bibliography was compiled in connection with a study of the radiation effects on electronic equipment. Information was gathered on the effects of mixed reactor radiation on transient and damage effects in the electronic equipment. The sources consulted include the holdings of LMSC, Technical Information Center, report literature, recent journals, symposia, and conferences. The abstracts are arranged alphabetically by author. The search was completed in February 1962. (Author)

AD-277 842 Div. 8, 14
(TISTM/BRW) OTS price $2.25

General Electric Co., Schenectady, N. Y.
INVESTIGATION FOR THE DEVELOPMENT OF CERAMIC BODIES FOR ELECTRON TUBES.
Final rept.,
by H. R. Wisely. 8 June 62, 79p. incl. illus. tables, refs.
(Contract AF 19(604)7410, Proj. 4619)
(AFCRL 62-388)
Unclassified report

DESCRIPTORS: *Electron tubes - Materials, *Ceramic materials - Physical properties. Silicates, Alkaline earth compounds, Synthesis, Thermal expansion, Phase transitions, Barium compounds, Calcium compounds, Magnesium compounds, Aluminum compounds, Oxides, Crystal structure, Lattices, Iron compounds, Nickel compounds, Phosphates, Silicon compounds, Quartz crystals, Phase studies, Solids, Solutions, Boron compounds, Metals, Alloys.

Ceramic materials were sought whereby the range of ceramic materials available to the tube designer for use as tube envelopes and/or microwave windows would be extended. A summary of the thermal expansion data obtained during the experimental program is given. The experimental program provided information in the areas of compounds having high to moderate thermal expansion, and also on solid solution as a means of modifying the thermal expansion characteristics of MgO and silicate structures, principally Mg_2SiO_4. A compilation of the data obtained from the literature search is also included. (Author)

AD-277 844 Div. 8, 15
(TISTE/CRJ) OTS price $3.60

Rhode Island U., Kingston.
OPTIMUM PARAMETERS FOR A CLASS OF SURFACE WAVE ANTENNAS,
by Julius Kane. Mar 62, 40p. incl. illus.
12 refs. (Scientific rept. no. 7983/2)
(Contract AF 19(604)7983, Proj. 5635)
(AFCRL 62-187) Unclassified report

DESCRIPTORS: *Antennas - Mathematical analysis. Magnetic fields, Electric fields, Polarization, Electromagnetic waves, Theory, Electromagnetic wave reflections, Antenna radiation patterns, Resistance, Functions, Integral equations.

A mathematical model is investigated of a class of surface wave antennas. A feature of the analysis was to show that various items of physical interest, such as gain and radiation resistance, can be displayed as elementary mathematical expressions. This permitted a theoretical interpretation of various facets of operation which, while well known from practice, have not been theoretically explained. The results include an estimate of the gain obtainable for a given reactance and antenna length, a demonstration that the surface wave antenna is a non-resonant device since less than 1 db gain can be lost to resonant effects, and a calculation of the purity of the surface wave field as it emerges from the source field. The mathematical inquiry has served to validate a variety of empirical relationships, and illuminate the operating mechanisms of surface wave antennas. (Author)

AD-277 923 Div. 8, 25, 26
(TISTE/CAM) OTS price $2.60

Knights, James, Co., Sandwich, Ill.
VHF QUARTZ CRYSTAL UNITS CR-(XM-38)/U 150 mc TO 200 mc.
Formal rept. no. 2, 1 Oct 61-31 Mar 62 on Production Engineering Measure.
31 Mar 62, 20p.
(Contract DA 36-039-sc-85973)
Unclassified report

DESCRIPTORS: *Quartz crystals, *Crystal oscillators. Electrodes, Very high frequency, Design, Crystal holders, Manufacturing methods, Inductance, Resistance.

Crystals manufactured on 5th harmonic have shown series resistances of from 85 to 110 ohms or above, typically, when measured in the test set AN/TSM-15. Holder inductance measurements reflect differences in RX meter performance, some of the measurements indicating passing values, others not. This is also true of the holder resistance. The standard test set AN/TSM-15 is effective for use at these frequencies, but is much more difficult to use than other test sets in the series. There is no provision for measurements of resist-

steatite. The details discussed indicate that alumina is superior to steatite in every aspect of package quality and strength. (Author)

AD-277 731 Div. 8, 1
(TISTA/GEC) OTS price $3.60

Naval Air Test Center, Patuxent River, Md.
INSTALLATION AND EVALUATION OF ENGINE PERFORMANCE ANALYSIS EQUIPMENT.
Interim rept. no. 1,
by A. R. Hughes and R. N. Stewart. 4 June 62,
1v. incl. illus. (Serial no. ST32-187)
Unclassified report

DESCRIPTORS: *Electronic recording systems, *Installation - Handbooks. Effectiveness, Vibration, Temperature, Time, Turbojet engines, Jet fighters, Naval aircraft, Turbojet inlets, Potentiometers, Tachometers, Pressure, Life expectancy, Maintenance.

The Service Test Division installed and evaluated the Sperry Turbine Vibration Indicator System and the Avien Time-Temperature Recorder System in the model F8U-2 airplane. Both systems are satisfactory for service use in the F8U-2. It is recommended that future installations be performed in accordance with the procedures described in this report. (Author)

AD-277 737 Div. 8, 12
(TISTE/CDM) OTS price $7.60

Philco Corp., Palo Alto, Calif.
SYSTEM APPLICATION OF LOW-NOISE PREAMPLIFIERS,
by H. Pruefert. 15 June 62, 1v. incl. illus.
(Rept. no. WDL-TR-1746)
(Contract AF 04(647)829)
Unclassified report

DESCRIPTORS: *Preamplifiers, *Parametric amplifiers, *Masers, *Telemetering receivers, *Ground support equipment. Electron beams, Signal-to-noise ratio, Sensitivity, Noise (Radio), Noise (Radar), Cryogenics, Satellite vehicles, Aerial reconnaissance, Very high frequency, High frequency, Antennas.

A study was made of low-noise preamplifiers for 239A system application. An expression for system sensitivity was developed. The relative weight of important factors in this expression (i.e., antenna noise temperature, front-end losses, and first preamplifier) was studied. The electron beam parametric amplifier, the cooled parametric amplifier, and the maser were investigated as to their suitability for field installation. The maser preamplifier offered the most desirable performance characteristics and satisfied all requirements for 239A field installation. The components of a maser preamplifier integrated into the 239A receiving system are specified in detail. (Author)

AD-277 754 Div. 8, 25
(TISTP/JW) OTS price $5.60

Westinghouse Electric Corp., Baltimore, Md.
STUDY OF FAILURE MECHANISMS.
Quarterly rept. no. 2, 1 Oct-31 Dec 61,
by S. M. Skinner and J. W. Dzimianski.
6 June 62, 1v. incl. illus. tables, refs.
(Rept. no. A15611AY2A; 382A2)
(Contract AF 30(602)2558, Proj. 5519)
(RADC TDR 62-160)
Unclassified report

DESCRIPTORS: *Electronic equipment, *Failure (Mechanics). Fatigue (Mechanics), Storage, Transistors, Reliability, Radiation effects.

The particular mechanisms involved in failure of electronic materials and electronic parts are identified. A complete analysis of the types and distributions of failures occurring during the assembly and manufacture phase of a closely controlled military data processing system has been completed. Among conclusions are relative likelihoods of failure of different electronic components, types of failure observed, relative frequency of human error during assembly and manufacture, and steps desirable if the favorable results of a massive component reliability program are to be translated into systems reliability. A possible mechanism for failures of transistors in practice has been investigated and confirmed. The effects of surface charges accumulating on transistors during the manufacturing phases can either alter characteristics such as collector resistance or beta, or can convert transistor response to that typical of a resistor. Techniques are described to avoid this latter type of failure. Failures as a result of radiation damage are being investigated through use of the Mossbauer effect. (Author)

AD-277 755 Div. 8, 7
(TISTP/JW) OTS price $1.10

Westinghouse Electric Corp., Baltimore, Md.
ELECTROLUMINESCENT FERROELECTRIC (ELF) SOLID STATE DISPLAY.
Quarterly interim development rept. no. 16,
1 Mar-31 May 62.
31 May 62, 6p. incl. illus. tables.
(Contract NObsr-72782)
Unclassified report

DESCRIPTORS: *Display systems, *Luminescent materials, *Electronic switches, *Ferroelectric materials. Solid state physics, Ionic current, Electrostriction, Switches, Resistors.

AD-277 792 Div. 8, 22
(TISTW/EET) OTS price $.50

Naval Ordnance Lab., White Oak, Md.
COMMENTS ON THE TEMPERATURE COEFFICIENT OF RESISTANCE AS USED IN WIRE BRIDGE ELECTRO-EXPLOSIVE DEVICE ANALYSES,
by J. N. Ayres. Nov 61, 9p. incl. tables,
3 refs. (Rept. no. NOLTR 61-154)
Unclassified report

DESCRIPTORS: *Electromagnetic waves - Hazards. Bridges, Wire, Temperature, Resistance, Measurement, Errors, Mathematical analysis, Ordnance, Hazards, Theory, Analysis.

As part of the Naval Ordnance Laboratory's effort on the HERO (Hazards of Electromagnetic Radiation to Ordnance) program, an electro-thermal model has been postulated to explain the response of electro-explosive devices to various electrical environments. Mathematical implementation of this model requires the use of an equation relating the resistance of the EED bridgewire to its temperature. Misunderstanding of the detail of this resistance-temperature relationship has been all too often encountered. It is the purpose of the report to explain the sources of confusion and thereby eliminate the errors resulting therefrom. (Author)

AD-277 836 Div. 8, 26
(TISTE/CAM) OTS price $9.10

RCA Defense Electronic Products, Camden, N. J.
MICRO-MODULE PRODUCTION PROGRAM.
Quarterly rept. no. 16, 1 Jan-1 Apr 62,
1 Apr 62, 106p. incl. illus. tables.
(Contract DA 36-039-sc-75968)
Unclassified report

DESCRIPTORS: *Microminiaturization (Electronics), *Manufacturing methods. Capacitors, Resistors, Coils, Pulse transformers, Semi-

June 62, 76p. incl. illus. 21 refs. (Technical rept. no. 22)
(Contract Nonr-184139)
Unclassified report

DESCRIPTORS: *Plastic tubing, *Fluid flow, *Bubbles, Test equipment, Test methods, Analysis.

The process of transition from bubble to slug flow in a vertical pipe has been studied analytically and experimentally. An equation is presented which gives the agglomeration time as a function of void fraction, channel diameter, initial bubble diameter and liquid purity. A dependent function which also appears in the equation was evaluated using experimental data. A reasonably good correlation of data was achieved. (Author)

AD-277 640 Div. 9, 25
(TISTP/JW) OTS price $8.10

Stanford U., Calif.
SPOT COOLING AND HEATING OF SURFACES WITH HIGH VELOCITY IMPINGING AIR JETS. PART I. SLOT JETS ON PLANE SURFACES,
by Darryl Eugene Metzger. Apr 62, 60p. incl. illus. tables, 12 refs. (Technical rept. no. 52)
(Contract Nonr-22523, Proj. NR-090-342)
Unclassified report

DESCRIPTORS: *Jets, *Heat transfer. Cooling, Air ejection, Nozzles, Temperature coefficient of reactivity, Fluid flow, Surfaces.

Localized cooling of furnaces with jets of air is common in industry. The particular case of a small, high velocity slot jet impinging normally on a plane surface is studied experimentally by use of a transient method. The method is shown to be of use in determining local, as well as average, heat transfer coefficients. These results are presented in nondimensional form which will facilitate extension to fluids and slot dimensions other than those used in the tests. Some limited results for circular jets are also included, and these are compared to the slot jet. (Author)

AD-277 739 Div. 9
(TISTA/VGW) OTS price $9.10

Princeton U., N. J.
ON THE STABILITY OF AIRBORNE TOWED VEHICLES,
by Micheal B. Burton and Harry Passmore, III. May 62, 1v. incl. illus. tables, 11 refs.
(Rept. no. 603)
(Contract N62269-1369)
Unclassified report

DESCRIPTORS: *Towed bodies - Aerodynamics. Towing planes, Towing cables, Stability (Lateral), Stability (Longitudinal), Yaw, Mathematical analysis, Analog systems, Analog computer, Partial differential equations.

Studies of the dynamic stability of heavy bodies with lifting surfaces towed behind an airplane are presented. Following a fairly complete analysis of cable dynamics, analyses of the longitudinal, lateral and coupled motions of the system are developed and discussed. A current configuration is chosen as a starting point from which the studies are expanded to develop stability boundaries of the important parameters. (Author)

AD-277 803 Div. 9, 1
(TISTA/WAW) OTS price $3.00

Lockheed Aircraft Corp., Marietta, Ga.
A THEORETICAL AND EXPERIMENTAL INVESTIGATION OF THE ACOUSTIC RESPONSE OF CAVITIES IN AN AERODYNAMIC FLOW.
Final rept. on Dynamic Problems in Flight Vehicles,
by H. E. Plumblee, J. S. Gibson, and L. W. Lassiter. Mar 62, 152p. incl. illus. tables, 9 refs.
(Contract AF 33(616)6966, Proj. 1370)
(WADD TR 61-75) Unclassified report

DESCRIPTORS: *Airframes - Acoustics. Supersonics, Aerodynamics, Pressure, Resonance, Mathematical analysis, Integral equations.

Theory is developed for the resonant frequencies and pressure amplifications of a rectangular cavity of arbitrary dimensions in a flow field. An intermediate step involves the derivation of radiation impedance for a cavity at all Mach numbers, using the concepts of retarded potential theory. Experimental results are given for small cavities tested in the subsonic regime and for cavities up to 8 in. in length at supersonic Mach numbers from 1.75 to 5.0. Comparisons are drawn between theoretical and experimental frequency and amplitude response, indicating that the theory developed gives very good definition of the problem. (Author)

AD-277 918 Div. 9, 31
(TISTP/WH) OTS price $10.10

Hydronautics, Inc., Rockville, Md.
LOW DRAG SUPERCAVITATING HYDROFOIL SECTIONS,
by Jakob Auslaender. Apr 62, 54p. illus. tables, 97 refs. (Technical rept. no. 001-7)
(Contract NObs-78396)
Unclassified report

DESCRIPTORS: *Hydrofoils, *Cavitation. Hydrodynamics, Lift, Drag.

The existing theory and experimental information on the design and performance of two-dimensional, low-drag, supercavitating and fully ventilated hydrofoils are reviewed. The results of detailed calculations based on linearized cavity flow theory (neglecting gravity) at zero cavitation number are presented in the form of lift-cavity drag ratio vs. lift coefficient and non-dimensional bending modulus vs. lift coefficient of low-drag foils designed specifically for operation at depths of 1/2, 1, 2, and 5 chords, as well as infinite depth. The design of foils for arbitrary depths, including methods of interpolation between depths for which detailed plots are available is described. The necessary non-linear corrections and the effect of finite cavitation number are evaluated. The theory is in good agreement with experimental information found in the literature. (Author)

10. FUELS AND COMBUSTION

AD-277 653 Div. 10, 25
(TISTA/GEC) OTS price $13.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THERMODYNAMIC CALCULATIONS FOR ROCKET ENGINES (Termodinamicheskiy Raschet Raketnykh),
by B. A. Nikolayev. 15 June 62, 193p. incl. illus. tables, 9 refs. (Trans. no. FTD-TT-62-271 from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Oborongiz, Moskva, 147p., 1960)
Unclassified report

DESCRIPTORS: *Rocket motors - Combustion, *Thermodynamics - Theory. Thrust, Exhaust gases, Temperature, Specific heat, Liquid rocket propellants, Mathematical analysis, Carbon, Nitrogen, Hydrogen, Oxygen, USSR.

ance above about 105 ohms. It will be difficult to make performance checks, such as TC runs, using this test set as a standard oscillator. (Author)

AD-277 925 Div. 8
(TISTE/CDM) OTS price $5.60

Microwave Associates, Inc., Burlington, Mass.
FAILURE MECHANISMS IN ULTRA HIGH POWER TRANSMISSION LINES.
Quarterly progress rept. no. 1, 19 June-19 Dec 61,
by Meyer Gilden. 19 Dec 61, 56p. incl. illus. tables, 15 refs.
(Contract AF 30(602)2545)
(RADC TDR-62-208) Unclassified report

DESCRIPTORS: *Transmission lines - Failure (Mechanics), *Waveguides. Radiofrequency power, Microwave frequency, Mathematical analysis, Electric fields, High temperature research, Cooling, Attenuation, Electric arcs, Heating, Particles, Coolants, L band, S band, X band, K band, Gases, Theory, Radiofrequency filters.

Research was conducted on failure mechanisms in microwave transmission lines at ultra-high power levels. Electrical breakdown under non-uniform conditions is discussed. The application of the variational technique for solving the diffusion equation is treated as well as the derivation of an additional term for the diffusion equation to account for non-uniformities in the gas density. As part of the non-uniform electric field problem, expressions are derived for an idealized rough surface. As part of the more general effects of non-uniform conditions it is shown that a small foreign body in a waveguide can become extremely hot and cause reductions in peak power breakdown thresholds of approximately 5:1. An analysis of the cooling capabilities of an internal gas flow in a waveguide shows that under restricted conditions the power dissipation can be increased by a factor of two or three. Finally the characteristics of a mode suppression filter of oversized, large wave length, rectangular waveguide are derived and discussed. (Author)

AD-277 932 Div. 8
(TISTE/CAM) OTS price $.50

Naval Research Lab., Washington, D. C.
ADAPTATION OF TUNNEL DIODE STATIC INVERTER TO HIGHER INPUT VOLTAGES.
Interim rept.,
by J. M. Marzolf. 15 June 61, 5p. incl. illus.
(NRL rept. no. 5802)
Unclassified report

DESCRIPTORS: *Inverter circuits, *Diodes, *Transformers. Trigger circuits, Switching circuits, Transistors, Voltage, Direct current, Power supplies, Solar cells, Thermoelectricity.

The basic tunnel diode static inverter employing a single tunnel diode in each loop operates at approximately 0.25 volt dc input and is applicable with thermoelectric and solar cell power supplies. Two or more tunnel diodes in series in each loop have been used with an external triggering circuit to accept higher input voltages. This development makes the tunnel diode static inverter compatible with thermionic and fuel cell generators, whose optimum output voltage is apparently in the range of 0.75 to 1 volt, and is the only practical method at the present time of stepping up such low-voltage dc power sources. (Author)

AD-277 943 Div. 8, 20
(TISTB/AW) OTS price $2.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST 59.
Rept. for 1-30 June 62.
15 July 62, 19p. (REIC Accession list no. 59)
(Contract AF 33(616)7375, Proj. 1448)
Unclassified report

DESCRIPTORS: *Radiation effects - Reports, *Reports. Electronic equipment, Polymers, Organic compounds, Inorganic substances, Metals, Ceramic materials, Dosimeters, Nuclear power plants, Space flight, Ionosphere, Nuclear explosions, Solar cells, Germanium, Semiconductors.

9. FLUID MECHANICS

AD-277 587 Div. 9
(TISTA/WAW) OTS price $8.60

University of Southern Calif. Engineering Center, Los Angeles.
A STUDY OF COMPRESSIBLE AND INCOMPRESSIBLE VISCOUS FLOW IN SLENDER CHANNELS,
by James C. Williams III. June 62, 81p. incl. illus. table, 14 refs. (USCEC rept. no. 83-213)
(Contract AF 49(638)831, Proj. 9783)
Unclassified report

DESCRIPTORS: *Pipes - Fluid flow, *Fluid flow - Mathematical analysis, *Ducts - Fluid flow, *Compressible flow - Mathematical analysis. Viscosity, Axially symmetric flow, Differential equations, Partial differential equations, Integral equations.

An analytical study is made of viscous compressible and incompressible flow in slender channels. By performing an order of magnitude analysis, similar to that employed in deriving the Prandtl boundary layer equations, a set of approximate equations of motion, valid for the entire compressible or incompressible viscous flow field in slender channels, was obtained. These approximate equations of motion are identical with the Prandtl boundary layer equations. It is found that accurate similar solutions in the incompressible two-dimensional problems are possible for flows in convergent or divergent channels with plane walls. For incompressible axisymmetric flow, similar solutions are possible for flow in channels where the wall shape varies exponentially with the distance along the channel. In the case of two-dimensional compressible flow with adiabatic walls, similar solutions are possible for a variety of wall shapes and pressure gradients. A detailed study of compressible flows in convergent-divergent channels is made to determine the effects of viscosity on the location of the sonic line, on the pressure ratio at the geometric throat and on the discharge coefficient for such channels. (Author)

AD-277 630 Div. 9, 30
(TISTP/GRW) OTS price $8.10

Massachusetts Inst. of Tech., Div. of Sponsored Research, Cambridge.
THE TRANSITION FROM TWO PHASE BUBBLE FLOW TO SLUG FLOW,
by Nick A. Radovcich and Raphael Moissis.

*Electrical power production. Gravity, Weightlessness, Vacuum systems, Radiation hazards, Meteorites, Thermal radiation, Fuel cells, Solar cells, Nuclear power plants, Spaceships, Space probes, Mars, Venus, High altitude, Space flight, Simulation, Space environmental conditions, Rockets, Liquid metals.

A survey has been made of facilities suitable for development and reliability testing of electrical space power systems, including facilities built or proposed to support the major space power system programs now under development. Basic research and development facilities are presently available for the various space power systems now under development, but they are primarily designed along with the particular system to satisfy a given need. Facilities for systems testing, particularly those for space environment simulation, are limited. Due to their high cost and involved set-up and operating conditions, scheduling becomes a prime factor in their usage. No facilities are presently available for complete range vehicle integration testing, where life support conditions must be added to and/or nuclear radiation handled in space environment simulation, but several large environmental chambers have been proposed. (Author)

AD-277 580 Div. 12, 15
(TISTP/JW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
COMMENTS ON THE CRITICAL INCLINATION PROBLEM,
by Richard B. Barrar. 14 June 62, 16p. 2 refs.
(Rept. no. SP-850)
Unclassified report

DESCRIPTORS: *Harmonic analysis, *Orbital flight paths. Satellite vehicle trajectories, Mathematical analysis.

The Brouwer (1959) procedure of using the Von Zippel method to integrate the equations of motion of a satellite of an oblate planet is reinvestigated. By changing the procedure slightly, an answer is obtained that is valid for all inclination angles, if only the zero and second harmonic are considered. The answer diverges differently if the fourth harmonic is considered. This shows that the divergence of the answer is of a mathematical rather than a physical nature. The present paper, together with the Brouwer and Garfinkel papers, covers all inclination angles. (Author)

AD-277 589 Div. 12
(TISTW/RD) OTS price $4.60

Bendix Corp., Detroit, Mich.
RESEARCH AND DEVELOPMENT FOR FUTURE ACTIVE RADAR MISSILE GUIDANCE, VOLUME IV.
Final engineering rept.,
by H. A. Bazydlo, J. R. Burnett and others.
27 May 62, 1v. incl. illus. (Rept. no. 2107, vol. 4)
(Contract NOa(s) 59-6194-c)
Unclassified report

DESCRIPTORS: *Guided missiles - Guidance, *Radar target seekers. Guided missile antennas, Antennas, Auxiliary power plants, Gas generating systems, Hydraulic actuators, Hydraulic pressure pumps, Control systems, Servo systems.

Contents:
Pneumatic antenna control
Design of the servo-jet control
Test fixtures and test procedures
Effect of mass unbalance on total antenna weight

AD-277 646 Div. 12
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
IDENTIFICATION OF SPATIAL OBJECTS,
by V. S. Fayn. 12 June 62, 13p. incl. 8 refs.
(Trans. no. FTD-TT-62-750 of Laboratoriya Sistem Peredachi Informatsii. "Problemy Peredachi Informatsii," 10:49-56, 1961)
Unclassified report

Presented at the All Union Symposium on Identification and Reading Machines, 14 July 1960.

DESCRIPTORS: *Satellite vehicles, *Identification systems. Tracking, Translations, USSR.

AD-277 649 Div. 12, 16
(TISTA/VGW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MEANS TO DEVELOP SPACE MICROBIOLOGY,
by N. Zhukov-Verezhnikov, V. Yakolev, and I. Mayskiy. 15 May 62, 8p. (Trans. no. FTD-TT-62-600)
Unclassified report

DESCRIPTORS: *Microbiology - Space environmental conditions, *Space medicine - USSR, *Satellite vehicle research - Sanitary engineering. Satellite vehicles, Biology, Translations.

The launching of artificial earth satellites and rockets marks a new stage in the development of all branches of knowledge. New, exceptionally interesting problems confront biology and medicine and, in connection with this, new specialties are appearing. Space microbiology can, in truth, be called such a new specialty. Its purpose is to study microscopic forms of life on the planets and other celestial bodies and also to use microorganisms for studying the conditions of life in space. Whereas the effect of space factors on physiological performances can be studied in highly organized animals, the determination of the limits of cell viability in time and genetic variations can be investigated mainly by means of microorganisms sent into space. A determination of the time that large animals can stay in space is restricted by the supplies of food and oxygen, and a study of the genetic effect is hampered by the slow change of generations in animals. But it is a different matter with microorganisms. Certain of them can be sent into the universe for an indefinite period of time. At the same time the extremely rapid change of their generations makes it possible to establish the genetic effect of space factors. (Author)

AD-277 829 Div. 12
(TISTA/VGW) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
TELEPHOTO SYSTEMS FOR SIDEWINDER-TYPE SEEKERS (A PRELIMINARY STUDY),
by R. E. Lawrence and A. H. Shoemaker.
June 62, 10p. incl. illus. (NOTS TP 2959)
(NAVWEPS rept. no. 7930)
Unclassified report

DESCRIPTORS: *Telephoto lenses, *Infrared optical systems. Guided missiles, Air to air, Instrumentation, Curved mirrors, Optical systems, Analysis, Effectiveness.

A telephoto Sidewinder seeker, similar to the standard optical systems in the Sidewinder family except that a negative mirror is substituted for the normally flat secondary mirror, is compared

This book presents an approximate method for the calculation of thermodynamic parameters of the products of combustion in a rocket engine, as well as a method for the calculation of the specific thrust, without a determination of the composition of the products of combustion. The proposed method will make it possible to calculate these parameters with relatively little effort but with a sufficient degree of accuracy from the practical standpoint. This method is valid for the products of combustion of fuels composed of C, H, N, and O, with some reservations with regard to the method for the latter. Examples of the calculations are presented. In addition, there is a description of a method for the determination of the composition of the products of combustion from the indicated fuels. (Author)

AD-277 802 Div. 10, 30
(TISTA/SEB) OTS price $9.60

Rocket Research Lab., Ohio State U., Columbus.
FLUID DYNAMICS OF ROCKET COMBUSTION.
Summary technical rept.,
by Loren E. Bollinger, James R. Nicholson and others. Apr 62, 104p. incl. illus. tables, 31 refs.
(Contract AF 33(616)5615, Proj. 7013)
(ARL 62-323)
Unclassified report

DESCRIPTORS: *Combustion - Reaction kinetics, *Nitrogen compounds - Detonation, *Hydrogen - Ignition, *Oxygen - Ignition. Oxides, Pressure, Explosions, Temperature, Kinetic theory, Decomposition, Liquid rocket propellants, Low pressure research, Theory, Gases, Analysis, Test equipment, Test methods, Mathematical analysis, Fluid mechanics.

The detonability of N20 was investigated. Detonation could not be achieved for initial pressures to 300 psig at 40 C initial temperature nor for initial pressures to 500 psig at 230 C initial temperature. Explosion limits were determined for pure N20 between atmospheric pressure and approximately 48 atm initial pressure when an exploding wire was employed to add energy to the gas in a bomb. Kinetics studies of N20 were conducted at 863, 896 and 925 K for initial pressures ranging from 250 to 555 psia. The reaction is primarily first order. Because of a spontaneous explosion at 925 K, the mechanism appears more complicated than just a simple first-order reaction. Ignition temperatures of H2-02 mixtures at atmospheric pressure were determined in a diaphragmless shock tube. For a 30% fuel concentration mixture, the lowest observed ignition temperature was 654 K with an ignition lag of 211 microsec. The shortest time delay was 36 microsec with an ignition temperature of 846 K. With a stoichiometric mixture, the lowest ignition temperature was 757 K. A glass vacuum system was constructed to study reactions at ultra low pressures. Pressures down to 8 x 10 to the -9 mm Hg were obtained. (Author)

AD-277 901 Div. 10, 30
(TISTA/GEC) OTS price $2.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
AN APPARATUS FOR MEASURING THE BULK MODULUS OF SOLID PROPELLANTS,
by Neal C. Wogsland. Apr 62, 27p. incl. illus. 15 refs. (BRL memo. rept. no. 1397, supersedes BRL technical note no. 1321)
Unclassified report

DESCRIPTORS: *Solid rocket propellants - Mechanical properties, *Elasticity - Test equipment. Measurement, Volume, Viscosity, Hydrostatic pressure, Temperature, Stresses, Analysis, Test methods, Mathematical analysis, Pressure.

An apparatus has been developed to measure the equilibrium bulk modulus of solid propellants and other viscoelastic materials at pressures between 0 and 2500 psig. Hydrostatic pressure is applied to a test sample in the high-pressure chamber of a pressure intensifier. Measurement of the volume displaced by the low-pressure end of the double piston provides high sensitivity in the measurement of the volume change in the high-pressure chamber. The measured isothermal modulus is sufficiently accurate for use in quasi-static stress analysis of solid-propellant rockets. In addition, the adiabatic bulk modulus can be estimated from pressure-volume-temperature data. Small voids in a propellant are vividly shown by a very fast initial rise in the curve of pressure vs. volume change. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

No Entries

12. GUIDED MISSILES

AD-277 525 Div. 12, 9
(TISTA/GEC) OTS price $2.50

Systems Technology, Inc., Inglewood, Calif.
OPERATING POINTS, PARTICLE DYNAMICS, AND COORDINATE SYSTEMS FOR AEROSPACE VEHICLE STABILITY AND CONTROL.
Final rept.,
by Duane T. McRuer and Irving Ashkenas. Mar 62, 97p. incl. illus. tables, 36 refs.
(Contract AF 33(616)5961, Proj. 8219)
(ASD TR 61-668) Unclassified report

DESCRIPTORS: *Spaceships - Stability, *Hypervelocity vehicles - Stability, *Satellite vehicles - Stability, *Space flight - Control. Dynamics, Orbital flight paths, Space environmental conditions, Theory, Mathematical analysis, Aerodynamics, Elasticity.

Conventional aeronautical stability and control usage is extended into the aerospace flight regime with particular reference to the definition of operating points and coordinate systems. Implied and studied in this extension are the basic particle-dynamic equations of motion, the magnitudes of possible external forces, and the flight regimes of fundamental interest. Simplified solutions of the particle-dynamic equations of motion are obtained, and certain low-frequency modes common to both particle and rigid-body motion are explored. (Author)

AD-277 546 Div. 12, 30
(TISTW/EET) OTS price $9.10

Aerospace Corp., Los Angeles, Calif.
SURVEY OF TESTING FACILITIES FOR ELECTRICAL SPACE POWER SYSTEMS,
by E. R. Berry and W. C. Fleher. 10 Apr 62, 95p. incl. illus. tables, 28 refs. (Rept. no. TDR-930(2570-40)TR-1)
(Contract AF 04(647)930)
(DCAS TDR 62-89) Unclassified report

DESCRIPTORS: *Satellite vehicles - Power supplies, *Test facilities - Power plants, *Power plants - Space environmental conditions,

13. INSTALLATIONS AND CONSTRUCTION

AD-277 506 Div. 13, 22, 1
(TIPSM/BRW) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
FUNDAMENTALS OF SAFETY FOR EXPERIMENTAL PROCESSING, HANDLING, AND STORAGE OF HIGH-ENERGY MATERIALS,
by K. S. Skaar. June 62, 8p. (NOTS TP 2866)
Unclassified report

DESCRIPTORS: *Explosives - Safety. Training.

This document presents safety fundamentals relevant to operations with almost all materials capable of sudden release of chemical energy and chemical products that may be harmful or dangerous. These fundamentals are intended primarily as training topics and as guides for evaluating safety programs in the fields of explosives, propellants, pyrotechnics, and the like. While the fundamentals were developed as training aids in a research and development organization, it is believed that they are applicable to almost any operation with dangerous materials. (Author)

AD-277 575 Div. 13
(TISTP/FR) OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
IGNITION OF FIRES AND FIRE SPREAD BY THERMAL RADIATION,
by F. W. Brown, III. 25 June 62, 22p. incl. illus. tables, 28 refs. (Technical note no. N-442)
(Proj. no. Y-F011-05-401(c))
Unclassified report

DESCRIPTORS: *Fires. Incendiary bombing, Thermal radiation, Nuclear explosions, Urban areas, Earthquakes.

The problem of primary and secondary fires resulting from a nuclear weapon explosion is discussed. The relationship between the incidents of secondary fires and earthquake-produced fires in the United States is discussed. Relationships between the area destroyed by fire and blast as a function of yield of nuclear weapons are presented. It is concluded that the ratio of fire damage area to the blast damage area increases with the yield of the weapon. Primary fire will be a significant factor and the elimination of potential fire sources is of the utmost importance. The probability that a fire storm can be prevented by the use of adequate firebreaks augmented by the use of fire retardant paint is proposed. It is recommended that existing military installations should be resurveyed to see what protective steps are feasible and necessary. (Author)

AD-277 600 Div. 13
(TISTB/MS) OTS price $2.25

Armed Services Technical Information Agency, Arlington, Va.
ACCIDENTS AND SAFETY MEASURES. A REPORT BIBLIOGRAPHY,
com[illegible]. by Maurice B. Silverman. June 62, 100p. 600 refs.
Unclassified report

DESCRIPTORS: *Accidents, *Aviation accidents, *Aviation injuries, *Safety, *Safety devices. Vehicles, Motor vehicle operators, Motor accidents, Ships, Injuries.

AD-277 912 Div. 13
(TISTE/CDM) OTS price $6.60

Fritz Engineering Lab., Lehigh U., Bethlehem, Pa.
END MOMENT - END ROTATION CHARACTERISTICS FOR BEAM - COLUMNS.
Rept. on Welded Continuous Frames and Their Components,
by Theodore V. Galambos and Maxwell G. Lay. May 62, 56p. incl. illus. tables, 16 refs. (Engineering Lab. rept. no. 205A.35)
(Contract Nonr-61003)
Unclassified report

DESCRIPTORS: *Beams - Steel, *Welded joints. Buckling, Deformation, Tests, Theory, Moments, Rotation, Flanges.

The end moment - end rotation behavior of wide flange steel beam-columns is discussed. It is shown that the theoretical moment-rotation curves agree well with those obtained from tests on full size columns, provided that failure occurs by excessive deflection in the plane of bending. As the rotation capacity of beam-columns is of considerable interest, comparisons are made between the theoretical and experimental values of this parameter. Local and lateral-torsional buckling may also contribute to the failure behavior of a beam-column and so approximate methods are presented which allow prediction of both the occurrence and effect of these phenomena. The amended rotation capacities are also compared with experimental results. Curves are presented which enable rotation capacity to be predicted for any combination of slenderness ratio, applied load and ratio of end moments. Interaction curves for local buckling and lateral-torsional buckling are also presented. (Author)

14. MATERIALS (NON-METALLIC)

AD-277 500 Div. 14, 4, 25
(TISTM/BRW) OTS price $8.60

Little, Arthur D., Inc., San Francisco, Calif.
THERMODYNAMIC AND KINETIC STUDIES FOR A REFRACTORY MATERIALS PROGRAM.
Rept. July 60-Dec 61, on Ceramic and Cermet Materials Development.
Apr 62, 85p. incl. illus. tables, 36 refs.
(Contract AF 33(616)7472, Proj. 7350)
(ASD TDR 62-204, pt. 1)
Unclassified report

DESCRIPTORS: *Refractory materials - Thermodynamics, *Hafnium compounds, *Zirconium compounds, *Borides, *Carbides. Reaction kinetics, Preparation, Zone melting, High temperature research, Controlled atmospheres, Calorimeters, Enthalpy, Specific heat, Mass spectrometers, Spectrographic analysis, Electron diffraction analysis, Transport properties, Halides, Vaporization, Diffusion, Gas flow.

with a standard system of the same aperture. Calculations (made for a particular case with the focal length of the telephoto about twice that of its standard counterpart) show that because of the residual aberrations, the angular image size for the telephoto is somewhat greater and thus the resolution is poorer than that of the standard system. (Author)

AD-277 911 Div. 12, 9
(TISTA/GEC) OTS price $11.00

Air Force Office of Scientific Research, Washington, D. C.
STUDY OF SOFT RECOVERY FROM TWO-STAGE VEHICLES. PART II. VERTICAL DESCENT TRAJECTORIES INCLUDING AERODYNAMIC HEATING,
by F. P. Ehni and W. F. Haldeman. May 62, 141p. incl. illus. 5 refs. (Rept. no. AFOSR/DRA 62-7) (Proj. 7856)
Unclassified report

DESCRIPTORS: *Re-entry vehicles - Exterior ballistics, *Re-entry aerodynamics - Mathematical analysis, *Recovery. Booster rockets, Research test vehicles, Sounding rockets, Deceleration, Dynamics, Pressure, Aerodynamic heating, Temperature, Drag, Velocity, Tables, Equations, Analog computer.

Vertical descent trajectories are presented in graphical form for bodies entering the earth's atmosphere starting at an altitude of 320,000 ft. with entry speeds varying from 35,000 to 7,500 fps. Two sets of trajectories were computed: one with fixed drag-area-to-weight ratios ranging from 10 to .001, and one set, where the drag-area-to-weight ratio is varying to achieve reentry with decelerations limited to 75, 30 and 15 g. The variation of the drag-to-weight ratio during descent was expressed in terms of a drag-area factor C. The computations were performed on an analog computer. Presented are graphs for velocity, deceleration, dynamic pressure, heating rate, total heat, temperature, and, for the limited deceleration case, the drag-area factor, plotted versus time and/or altitude. The physical equations are presented and their analog computer mechanization is discussed. (Author)

AD-277 941 Div. 12
(TISTB/AW) OTS price $2.60

RCA Defense Electronic Products, Burlington, Mass.
A TIME SERIES ANALYSIS OF RADAR OBSERVATIONS ON SATELLITES.
Rept. on Proj. Space Track,
by A. Arcese. Mar 62, 27p. incl. illus. table, 5 refs.
(Contract AF 19(604)8079)
(ESD TDR 62-40) Unclassified report

DESCRIPTORS: *Satellites, *Radar tracking, *Radar plotting, *Orbital flight paths, Series, Statistical analysis, Mathematical prediction, Time.

A time series analysis was performed on observations from satellite 59, Epsilon I, pass 3319, as taken by the Millstone Hill radar located at Westford, Mass. The observations were fitted by a trend and autoregressive scheme and the convariance matrix of the residuals were obtained. It was found that fitting the observations in time by a trend and autoregression scheme better described the process than trend fitting alone. In addition, this gave rise to independence between the observations. An important consequence of this result is that it can be shown that best estimators for predicting orbital elements can be obtained with independent estimators of the observations that describe the process. (Author)

polyphase ceramic systems composed of a high Young's modulus continuous phase containing a low Young's modulus dispersed phase has been conducted using the model system zirconium carbide-graphite. The principal effect of the dispersed phase of graphite on the thermal shock resistance of the zirconium carbide is to reduce the degree of damage resulting from fracture by thermal shock. The presence of the graphite also causes a decrease in strength and Young's modulus of elasticity in such a manner as to decrease the elastic energy stored at fracture and at higher volume fractions graphite to increase the extensibility (i.e., strain at fracture). Suitable thermal shock damage resistance factors were derived. The coefficient of thermal expansion and Poisson's ratio to a first approximation were independent of graphite content. Due to the relative differences in thermal properties the graphite causes an increase in thermal conductivity, thermal diffusivity and emissivity. Porosity was found to be a major variable. Emissivity (absorptivity) was introduced as a variable affecting thermal shock resistance of ceramic materials. A quantitative theory of thermal shock by radiation was developed. (Author)

AD-277 615 Div. 14, 4, 12
(TISTM/REB) OTS price $3.60

Midwest Research Inst., Kansas City, Mo.
SYNTHESIS AND EVALUATION OF BISBICYCLIC DIEPOXIDES.
Final rept., 15 Oct 61-14 May 62,
by Thomas M. Medved and Howard W. Christie.
15 June 62, 26p. incl. illus. 4 refs.
(Contract NOw 62-0475-d)
Unclassified report

DESCRIPTORS: *Heat resistant polymers - Synthesis, *Epoxy resins, *Epoxides, *Aircraft finishes, *Plastic coatings. Supersonic planes, Transparent panels, Octanes, Heptanes, Polycyclic compounds, Ethers.

Synthesis of bis[2-(bicyclo[2.2.1]heptane 5,6-epoxy)-methyl] oxide (diepoxide 262) was accomplished with difficulty. The intermediate ether was obtained by the Williamson ether synthesis route. Two major fractions of the diepoxide were cured with maleic anhydride and trimethylolethane to yield resins of similar properties. However, the resins obtained from this curing system were colored. Cure of 5,6-epoxybicyclo[2.2.2]octane-2-methyl 5',6'-epoxybicyclo[2.2.2]octane-2-carboxylate (diepoxide 304) with maleic anhydride and trimethylolethane yielded a dark brown, brittle, thermoplastic material. The ether-linked bisbicyclic diepoxide (resin 262) was the most thermally stable and rigid of all the bicyclic compounds synthesized. When cured with maleic anhydride and trimethylolethane at temperatures up to 220 C a Vicat penetration temperature of 518 F (270 C) was obtained. Resins derived from diepoxide 262 compare favorably in thermal rigidity with many anhydride cured bisphenol epoxides but have lower stabilities than dicyclopentadiene dioxide or epoxy-novolac resins. No completely colorless resins were made. (Author)

AD-277 686 Div. 14, 27
(TISTM/REB) OTS price $1.25

Watertown Arsenal Labs., Mass.
SOME PHYSICAL PROPERTIES OF POLYCRYSTALLINE SILICON BORIDE.
by Robert S. Feigelson. May 62, 39p. incl. illus. tables, 11 refs. (Technical rept. no. WAL TR 853/1)
Unclassified report

DESCRIPTORS: *Silicon compounds - Physical properties, *Borides. Thermal conductivity, Electrical conductance, Thermal expansion, Elasticity, Synthesis, Materials, Rocket motors, Crystals, Electrical properties, Mechanical properties, Hardness, Microstructure, Oxidation, Resistance, Ceramic materials.

Silicon hexaboride and silicon tetraboride were synthesized, isolated from reaction products, and fabricated into dense self-bonded structures. The physical properties of these polycrystalline structures were determined, including thermal expansion, thermal conductivity, electrical conductivity, oxidation resistance, transverse strength, modulus of elasticity and microhardness. Silicon tetraboride was synthesized by a solid state reaction of the elements in Ar at a temperature not exceeding 1300 C. Excess Si was removed by reaction with Br gas and the purified powder fabricated into a dense body by hot pressing a prepressed section at 1350 C and 6000 psi for between 3 and 4 hours. Maximum density obtained was 2.08 g/cc. Silicon hexaboride was easily synthesized by reactions similar to the tetraboride at temperatures of 1600 C or better. Excess Si was removed by treatment in very dilute hydrofluoric and nitric acid solutions and the purified powder fabricated into a dense body by hot pressing a prepressed section at 1500 C and 6000 psi for 2 hours. A maximum density of 2.41 g/cc was obtained. (Author)

AD-277 794 Div. 14, 4
(TISTM/REB) OTS price $1.00

National Carbon Co., Inc., Cleveland, Ohio.
RESEARCH STUDY TO DETERMINE THE PHASE EQUILIBRIUM RELATIONS OF SELECTED METAL CARBIDES AT HIGH TEMPERATURES.
Summary rept.,
by R. V. Sara and R. T. Dolloff. Apr 62, 31p. incl. illus. 31 refs.
(Contract AF 33(616)6286, Proj. 7350)
(WADD TR 60-143, pt. 3)
Unclassified report

DESCRIPTORS: *Carbides, *Zirconium compounds, *Tungsten compounds. Phase studies, High temperature research, Eutectics, Ceramic materials, Analysis, Temperature.

Investigations were made of phase equilibria in the binary systems, W-C and Zr-C. A completed phase diagram for the W-C system is presented which differs significantly from the one proposed by Sykes (Trans. Am. Soc. Steel Treating 18:968, 1930) and which is generally accepted today. A tentative phase diagram for the Zr-C system is included. Data were obtained by high-temperature differential thermal analysis and classical quenching procedures, both supplemented by metallographic, X-ray, and chemical techniques. Results for the W-C binary system indicate eutectics between W and W2C at 2710 C and between W2C and beta-WC at 2765 C. The W2C lattice accommodates 72 and 74 at-% W at 2460 and 2710 C, respectively. Carbon solubility is evident only at 2525 C, the eutectoid temperature. The melting point of W2C was found to be 2795 C. At 2755 C, WC decomposes into beta-WC and graphite. A new cubic phase (beta-WC) has been discovered which is stable only above 2525 C. The Zr-C system is characterized by eutectic temperatures of 1860 and 2850 C on the Zr-rich and C-rich sides of ZrC, respectively. ZrC is the only carbide phase which has been observed in this system. (Author)

Division 14 - MATERIALS (NON-METALLIC)

This report summarizes an integrated program of studies concerning thermodynamic and kinetic knowledge needed to describe the chemical behavior of zirconium and hafnium carbides and borides at temperatures to 3000K and in atmospheres of O2, O2 + H2O, C12, HF, F2, H2, CO, NH3, and N2. Both internal and subcontracted efforts are used which can (1) provide, through calorimetric measurements, additional thermodynamic data needed for the tabulation of free energy functions of the zirconium and hafnium carbides and borides; (2) identify, by mass spectrometric means, gaseous species formed on vaporization of these carbides and borides and on their interaction with the several atmospheres; (3) provide thermodynamic data for important gaseous species through electron diffraction techniques, matrix isolation spectroscopy, and equilibria studies; and (4) develop the kinetics of the reactions of the carbides and borides with the various atmospheres through studies of the over-all rates of reactions and mass transport mechanisms. (Author)

AD-277 508 Div. 14
(TISTM/REB) OTS price $4.60

Narmco Industries, Inc., San Diego, Calif.
OPTIMUM FILAMENT DIAMETER.
Quarterly rept. no. 2, 1 Apr-30 June 62,
by W. H. Otto, S. Dharmarajan, and C. Y. Chia.
30 June 62, 42p. incl. illus. tables, 9 refs.
(Contract NObs-86347)
Unclassified report

DESCRIPTORS: *Filament wound construction, *Filaments, *Glass textiles, *Composite materials, *Reinforcing materials. Fatigue (Mechanics), Mechanical properties, Buckling, Coatings, Sea water, Fibers, Pressure vessels, Submarine hulls.

Static fatigue tests were completed on 0.005-in.-diam. E-glass fibers coated with A-1100 coupling agent and Epon 828 resin. Strength testing was completed on resin-coated E-glass fibers immersed in sea water for 27 days. Statistical analysis of all immersion data is reported. Five-fiber coated strand has been produced at fiber diameters from 0.0004 to 0.005 in. for NOL ring winding. Theoretical analyses to determine the effects of diameter of fiber on the buckling load of a fiber reinforced composite column under axial compressive load and the effect of diameter of fibers on bending stress and pretension in a filament wound circular cylindrical shell were completed. (Author)

AD-277 517 Div. 14, 26, 30
(TISTM/BRW) OTS price $2.60

Rubber Lab., Mare Island Naval Shipyard,
Vallejo, Calif.
SUITABILITY OF VITON B O-RINGS FOR USE IN 3000 PSI HYDRAULIC SYSTEMS CONTAINING PETROLEUM BASE FLUID OR CELLULUBE 220.
Final rept.,
by R. D. Ford and R. E. Morris. 29 June 62,
25p. incl. tables, 12 refs. (Rept. no. 92-13)
(Proj. S-F013-13-01)
Unclassified report

DESCRIPTORS: *Hydraulic seals, *Plastic seals, *Specifications, *Test methods. Seals, Hydraulic systems, Hydrostatic pressure, Petroleum, Phosphates, Esters, Hydraulic fluids, Humidity, Corrosion, Oil seals, Rubber seals.

An investigation was made (1) to develop simulated service tests for evaluating Viton B O-rings for use in 3000 psi hydraulic systems containing either petroleum-base fluid or phosphate-ester fluid, and (2) to prepare a specification covering Viton B seals of all types for this service. Viton B O-rings with teflon backup rings were shown to seal ASTM No. 3 oil (petroleum base) and Cellulube 220 (phosphate ester) at 300 F in static service and at 160 F in dynamic service. Dynamic service at higher temperatures was impractical because of failure of the Teflon backup rings. The hydraulic pressure used in all tests was 3000 psi. The tendency of humidified Viton B O-rings to corrode metals cannot be eliminated by compounding the Viton B stock differently, but can be eliminated by merely washing the O-rings with soap and water before installation. A proposed specification for Viton B seals of all types is given. The results of the specification tests performed on laboratory-compounded O-rings and on commercial O-rings are described. (Author)

AD-277 531 Div. 14
(TISTM/BRW) OTS price $2.00

Utah U. Salt Lake City.
IMPURITY DEPENDENCE OF CREEP ALUMINUM OXIDE
Rept. on Refractory Inorganic Nonmetallic Materials,
by E. K. Beauchamp, G. S. Baker, and P. Gibbs.
Apr 62, 66p. incl. illus. tables, 72 refs.
(Contract AF 33(616)6832, Proj. 7350)
(ASD TR 61-481) Unclassified report

DESCRIPTORS: *Aluminum compounds - Mechanical properties, *Crystals - Creep. Oxides, Lattices, Deformation, Stresses, Transients, Relaxation time, Chemical impurities, Magnesium compounds, Manganese compounds, Carbonates, Diffusion, Fracture (Mechanics), Solid state physics, High temperature research.

Polycrystalline sintered compacts of doped Gulton Alucer MC alumina have been deformed in three point beam loading in the temperature range 1000 to 1350 C. Creep consisted of a transient deformation superposed on a steady state deformation. The steady state creep rate of specimens doped with MgO or MnCO3 from 50 to 5000 ppm by weight were fit to the expression A exp(-E/kT). The activation energy E was found to be 130 Kcal/Mole independent of added impurity. The constant A was independent of MnCO3. A decrease in A by a factor of 3-5 in samples doped with MgO may have been due to presence of some large grains. It is suggested that steady state creep of fine grained polycrystalline alumina is controlled by diffusion of vacancies. (Author)

AD-277 605 Div. 14
(TISTM/REB) OTS price $3.00

Carborundum Co., Niagara Falls, N. Y.
FACTORS AFFECTING THERMAL SHOCK RESISTANCE OF POLYPHASE CERAMIC BODIES.
Rept. for Oct 60-Dec 61 on Ceramic and Cermet Materials,
by D. P. H. Hasselman and P. T. B. Shaffer.
Apr 62, 155p. incl. illus. tables, 53 refs
(Contract AF 33(616)6806, Proj. 7350)
(WADD TR 60-749, pt. 2) Unclassified report

DESCRIPTORS: *Ceramic materials - Thermal stresses, *Shock resistance, *Zirconium compounds, *Carbides, *Graphite. Refractory materials, Mechanical properties, Thermal expansion, Thermal radiation, Thermal conductivity.

An investigation of the material properties which affect the thermal shock resistance of

COMPENSATING CROSS COUPLINGS IN MULTICHANNEL AUTOMATIC-CONTROL SYSTEMS,
by V. T. Morozovskiy. 14 May 62, 24p. incl. illus. tables, 8 refs. (Trans. no. FTD-TT-62-471 of Izvestiya Akademii nauk SSSR, OTN, Energetika i avtomatika 2:92-105, 1961)
Unclassified report

DESCRIPTORS: *Control systems, *Differential equations. Couplings, Analysis, Transformations (Mathematics).

AD-277 709 Div. 15
(TISTP/JW) OTS price $4.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
CONFIDENCE INTERVALS FOR THE RELIABILITY OF MULTI-COMPONENT SYSTEMS,
by John K. Abraham. May 62, 50p. incl. illus. tables, 2 refs. (BRL memo. rept. no. 1404)
Unclassified report

DESCRIPTORS: *Binomials, *Statistical distributions, *Probability. Reliability, Failure (Mechanics), Test methods, Linear systems, Numerical analysis.

A procedure for finding a confidence interval for the reliability, P, of a multi-component device is presented which utilizes Bernoulli test data pertaining to the component parts. In particular, Bernoulli trials are carried out for part of a system built up from k different parts. On the basis of the number of observed failures an interval estimate of the reliability (or probability of functioning) of the system is constructed. In the series case, with k parts, the minimum and maximum of P (as a function of q's) is found. In the general case, that is, for a system having a mixture of series and parallel-connected parts, parametric minima and maxima for P are found using several approaches.

AD-277 711 Div. 15
(TISTP/GRW) OTS price $3.60

Cook Electric Co., Morton Grove, Ill.
INVESTIGATIONS INTO MATHEMATICAL EFFECTIVENESS CRITERIA.
Final technical rept.,
by Timothy J. Horrigan. Mar 62, 27p. 3 refs. (Rept. no. 191-1)
(Contract AF 19(604)7497, Proj. 5632)
(AFCRL 62-161) Unclassified report

DESCRIPTORS: *Mathematics, *Potential theory. Industrial research, Measure theory.

The formulation of clear and rigorous mathematical criteria for system effectiveness is investigated. Although the investigation was in part motivated by mistrust of the use of expected values (first moments) for such purposes, their use is evidently vindicated. A set of intuitively acceptable axioms which define the desiderata required of possible measures of effectiveness is established. It is then shown that these axioms are sufficient to determine a measure of effectiveness. Peripheral material on the theory of random sets relevant to effectiveness computations is presented in appendix form. (Author)

AD-277 714 Div. 15
(TISTP/JW) OTS price $1.10

Deutscher Wetterdienst, Frankfurt (Germany).
ON THE SOLVING PROCEDURE OF THE BALANCE EQUATION,
by W. Edelmann and H. Reiser. 31 Dec 61, 5p. illus. 1 ref. (Technical note no. 2)
(Contract AF 61(052)373)
(AFCRL 62-658) Unclassified report

DESCRIPTORS: *Difference equations, *Operators (Mathematics). Functions.

AD-277 744 Div. 15
(TISTP/TL) OTS price $1.60

Research Triangle Inst., Durham, N. C.
DISPERSION ON A SPHERE: RAYLEIGH'S AND FISHER'S SOLUTIONS AND WATSON'S TEST FOR RANDOMNESS,
by M. A. Stephens. 2 July 62, 18p. incl. tables, 10 refs. (Technical rept. no. 7)
(Contract Nonr-342300)
Unclassified report

DESCRIPTORS: *Spheres, *Statistical distributions, *Statistical functions, *Statistical tests, *Scattering. Vector analysis, Polynomials, Numerical analysis, Operational calculus, Integral transforms, Differential equations, Tables, Probability.

The distribution of R, the size of the resultant of N unit vectors randomly oriented in three dimensions, was solved by Rayleigh and in a quite different form by Fisher. These forms are proved equivalent. An improved significant table is given for a test for randomness, proposed by Watson, and based on this distribution. An approximate test is suggested and compared with the exact test. The power of the exact test against a given alternative distribution, suggested by Fisher, is used to calculate a table of sample sizes. (Author)

AD-277 843 Div. 15
(TISTP/GRW) OTS price $1.60

Operations Evaluation Group, Office of Naval Operations, Washington, D. C.
AVOIDANCE IN ONE DIMENSION: A CONTINUOUS-MATRIX GAME.
Interim research memo.,
by Robert D. Arnold. 11 Jan 62, 14p. incl. illus. tables (IRM-10)
Unclassified report

DESCRIPTORS: *Games theory.

The game is a two-person zero-sum game. On each play, each player selects any point on a line of finite length. The payoff is a trapezoidal function of the separation between the two selected points; it is constant for separations from zero to R sub 1, changes linearly between R sub 1 and R sub 2, and is zero for separations greater than R sub 2. The derivation and proof of the solution are interesting due to the discontinuities in the slope of the payoff function. The solution includes the special cases of triangular (R sub 1 = 0) and rectangular (R sub 1 = R sub 2) payoff functions. The game is related to search theory in its applicability to the barrier problem. Uniform distribution along the barrier is not in general an optimal strategy for either the maximizer (detector) or the avoider (transitor). In selecting optimal strategies the detector must have more information on the payoff function (lateral range curve) than is required by the transitor. (Author)

AD-277 928 Div. 15, 30
(TISTP/WH) OTS price $1.60

Naval Research Lab., Washington, D. C.
A NAREC PROGRAM FOR LEAST SQUARE ERROR CURVE

Division 15 - MATHEMATICS

AD-277 799 Div. 14, 17, 30
(TISTM/BRW) OTS price $1.75

Northrop Corp., Hawthorne, Calif.
FATIGUE TESTING OF HONEYCOMB SANDWICH CONSTRUCTIONS.
Final rept., May 60-May 61.
Apr 62, 56p. incl. illus. tables, 5 refs.
(Contract AF 33(616)7200, Proj. 7381)
(ASD TR 61-338) Unclassified report

DESCRIPTORS: *Sandwich construction, *Honeycomb cores, *Fatigue (Mechanics). Test methods, Stresses, Physical properties, Stability, Dynamics, Loading, Soldered joints, Bonded joints, Brazing, Welded joints, Tensile properties, Mechanical properties, Deformation, Density, Thickness, Load distribution.

Dynamic methods, developed for determination of Young's modulus for honeycomb sandwich constructions, were successfully applied to obtain honeycomb core fatigue properties. S-N curves for extensional core fatigue were developed for representative samples of brazed, welded, and adhesive bonded honeycomb constructions. For tension - compression, the data show that core density is a dominant parameter in core fatigue. There are indications that core thickness up to and including 1 inch has little effect upon the data; more investigation is necessary to determine the effect of thickness greater than 1 inch. Feasibility of obtaining core fatigue using a two specimen shear modulus approach was demonstrated, but more development is necessary in the design of testing systems to obtain dynamic balance and proper load levels. (Author)

AD-277 920 Div. 14
(TISTM/TCG) OTS price $1.10

Naval Research Lab., Washington, D. C.
STABILITY OF PLANKTON OIL FILMS TO ARTIFICAL SUNLIGHT.
Interim rept.,
by C. O. Timmons. 13 June 62, 8p. incl. illus. table, 9 refs. (NRL rept. no. 5774)
Unclassified report

DESCRIPTORS: *Oils, *Films, *Stability - Oils, *Ultraviolet radiation. Light, Radiation effects, Photochemical reactions, Photosensitivity, Oxidation, Catalysis, Decomposition, Deterioration, Monomolecular films, Sea water, Aquatic animals.

Plankton oil monolayers spread on synthetic sea water and exposed to radiation approximating sunlight expand rapidly during the first several hours of exposure. There is an accompanying increase in collapse pressure. One case studied showed film breakdown to begin after 15-hours exposure time as evidenced by a decrease in the specific area of the film after this time and by the solution of the reaction products. It is concluded that plankton oil films do not disappear by photocatalyzed oxidation for periods equivalent to at least two days sunlight but they will subsequently dissolve by molecular scission. (Author)

AD-277 924 Div. 14, 24
(TISTM/EJH) OTS price $8.10

Institute of Research, Lehigh U., Bethlehem, Pa.
INKS FOR FIELD INK KIT.
Final rept., 15 Sep 60-15 Mar 62,
by Albert C. Zettlemoyer, William D. Schaeffer and others. 15 Mar 62, 87p. incl. illus. tables. (Contract DA 19-129-qm-1690, Proj. 7-96-11-001)
Unclassified report

DESCRIPTORS: *Ink, *Lithography. Specifications, Military equipment, Military requirements, Colors, Pigments, Standardization, Printing, Stability, Chemical properties, Physical properties.

Six series of lithographic inks and modifiers furnished by different manufacturers were examined to determine the feasibility of developing purchase specifications. New ink samples were obtained in an evaluation of potential specifications of ink color, color strength, specific gravity and grind (dispersion). Ink manufacturers indicated that the color specifications were inadequate; nevertheless, the color matches obtained were improved considerably compared to the initial samples. Specifications of ink color and color strength on the basis of bleach formulations and color standards require custom prepared standards, a number of which are currently inaccessible color gamuts. (Author)

15. MATHEMATICS

AD-277 519 Div. 15
(TISTP/GRW) OTS price $3.60

RAND Corp., Santa Monica, Calif.
SIMPLEX METHOD AND THEORY. NOTES ON LINEAR PROGRAMMING AND EXTENSIONS - PART 62,
by A. W. Tucker. June 62, 36p. incl. illus. refs. (Research memo. no. RM-3199-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Linear programming, *Scheduling.

The simplex method of linear programming is discussed in a format designed to exhibit overall structure rather than specific operational details. Various terminal possibilities are represented schematically and geometrically, and it is shown that transposition duality theorems can be regarded as corollaries of the duality theorem for a homogeneous linear program. (Author)

AD-277 614 Div. 15
(TISTP/JW) OTS price $2.60

Michigan U., Ann Arbor.
USEFUL IDENTITIES FOR HALF-SPACE PROBLEMS IN LINEAR TRANSPORT THEORY,
by R. E. Aamodt and K. M. Case. June 62, 27p. 10 refs.
Unclassified report

DESCRIPTORS: *Integral transforms, *Functions. Linear systems, Integral equations, Plasma physics, Surfaces, Reflectivity.

A typical translationally invariant linear transport problem for a half-space is solved by the eigenfunction method. Using some derived identities for the solution of the associated homogeneous Hilbert problem it is shown that the usual cumbersome integrals occurring in half-space problems can be reduced to a simple form. The usefulness of the identities is illustrated by solving the problem of a plasma confined to a half-space by a diffuse reflecting wall. (Author)

AD-277 647 Div. 15
(TISTP/JW) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE RATIONAL CHOICE OF THE STRUCTURE OF

AD-277 650 Div. 16
(TISTB/CCH) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CHANGE IN THE BIOELECTRICAL ACTIVITY OF VARIOUS BRAIN REGIONS OF CATS AND DOGS ON EXPOSURE TO CARBON DIOXIDE,
by Yu. N. Ivanov. 18 May 62, 21p. incl. illus. table, 23 refs. (Trans. no. FTD-TT-62-773 of Fiziologicheskiy Zhurnal SSSR im. I. M. Sechenova 68:279-283, 1962)

Unclassified report

DESCRIPTORS: *Brain - Electrical properties, *Blood, *Carbon dioxide - Dosage. Electroencephalography, Respiration, Nervous system, Laboratory animals, Cerebral cortex.

Inspiration of carbon dioxide in small (to 5%) concentrations leads to the development in all regions of the brain of cats and dogs, of characteristic electrical reactions: desynchronization in the cerebral cortex and regions of the optic thalami; desynchronization, manifestation of slow waves or changes in the salvos of electrical impulses in the medulla oblongata. The electrical activity of the cerebral cortex and mainly of its frontal regions changes earliest on exposure to small concentrations of CO2. The exposure of appreciable concentrations of CO2 (8-10% and higher) and of pure carbon dioxide does not enable us to ascertain the characteristics of the electrical responses of the brain regions and the normal dynamics of their occurrence. Narcosis, traumatism of the tissues, disruption of the blood supply, and other unfavorable conditions of the experiments can easily distort or even pervert the character of the reactions of the electrical activity of the various regions of the brain to the action of small concentrations of carbon dioxide. (Author)

AD-277 689 Div. 16, 4
(TISTB/AW) OTS price $2.50

School of Aerospace Medicine, Brooks Air Force Base, Tex.
A SURVEY OF COMPOUNDS FOR RADIATION PROTECTION,
by John Doull, Vivian Plzak, and Stanley J. Brois. Apr 62, 124p. incl. tables (Rept. no. 62-29)
(In cooperation with USAF Radiation Lab., U. of Chicago, Ill.)

Unclassified report

DESCRIPTORS: *Radioprotective drugs. Radiation injuries, Therapy, Effectiveness, Mice, Pharamacology, Toxicity, Dosage, Organic compounds, Tests, X rays, Alcohols, Thiols, Ethers, Aldehydes, Oximes, Ketones, Phenones, Acids, Thio radicals, Esters, Amides, Carbamates, Guanidines, Amines, Imines, Nitriles, Hydrazines, Pentanes, Hexanes, Thiazoles.

AD-277 693 Div. 16
(TISTB/AW) OTS price $1.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
EFFECTS OF 2-PAM AND EA 1814 ON NEUROMUSCULAR TRANSMISSION. I. EFFECTS OF 2-PAM AND EA 1814 ON THE FROG RECTUS ABDOMINIS MUSCLE PREPARATION,
by Joseph H. Fleisher and Thomas H. Moen. Mar 62, 18p. incl. tables, 21 refs. (Rept. no. CRDLR 3129)

Unclassified report

DESCRIPTORS: *Neuromuscular transmission, *Oximes. Muscles, Frogs, Nerves, Cholinesterase, Countermeasures, Therapy, Effectiveness, Pharmacology, Atropine, Acetylcholines, Physostigmine.

Contracture of the isolated frog Rectus abdominis muscle was used to study pharmacological properties of 2-PAM (2-pyridine aldoxime methiodide) and EA 1814 (1, 1'-trimethylene bis(4-formyl pyridine bromide) dioxime), other than those relating to reactivation of inhibited cholinesterase (ChE). For example, concentrations of 2-PAM in excess of 4 x 10 to the -5th power M potentiate contractures of the frog rectus muscle elicited by acetylcholine (ACh). This potentiation appears to result from an anticholinesterase (antiChE) property of this oxime and not from a direct depolarizing action. 2-PAM inhibits the response to the depolarizing agents, decamethonium and carbamylcholine, which are not susceptible to hydrolysis by the ChE of frog rectus muscle, and to ACh, if the rectus muscle ChE is first inhibited with eserine. EA 1814 showed only inhibitory properties. (Author)

AD-277 694 Div. 16
(TISTB/AW) OTS price $4.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
ERYTHROCYTE AND PLASMA VOLUMES IN GOATS BEFORE AND AFTER HEMORRHAGE AND REINFUSION OF BLOOD,
by Rubert S. Anderson, Fred W. Stemler and others. May 62, 42p. incl. tables, 42 refs. (Rept. no. CRDLR 3136)

Unclassified report

DESCRIPTORS: *Plasma volume. Erythrocytes, Measurement, Goats, Hemorrhage, Wounds, Physiology, Blood, Spleen, Hemoglobin, Blood proteins, Body weight, Blood circulation.

Some quantitative aspects of the circulation in goats have been studied to furnish basic information for other experimental work. The I131 method for plasma volumes and the Cr51 method for red cell volumes were tested and found useful. By this means, the balances of plasma volumes, red cell volumes, plasma proteins, and blood hemoglobins have been measured before and after severe hemorrhage. The F cells and F hemoglobin values are discussed in relation to Cr51 cell volumes and cell volumes calculated from the I131 plasma volumes and hematocrits. Plasma volumes per kilogram of body weight are compared with volumes obtained by others.

AD-277 839 Div. 16, 28
(TISTB/AW) OTS price $.75

Psycho-Acoustic Lab., Harvard U., Cambridge, Mass.
(No title).
Final rept., 1 Nov 45-31 Dec 61,
by Geraldine Stone. 31 Dec 61, 1v. (Rept. no. PNM-96)
(Contracts N5ori-7611 and Nonr-186615, Proj. NR 142-201)

Unclassified report

DESCRIPTORS: *Scientific reports, *Hearing, *Ear, *Noise, *Otorhinolaryngology. Vibration, Psychology, Physiology, Tactual perception, Skin, Vision, Acoustics, Bone, Measurement, Pitch discrimination, Audiometry, Auditory thresholds, Auditory perception, Speech, Psychoacoustics.

AD-277 946 Div. 16
(TISTB/AW) OTS price $2.60

Stanford Research Inst., Menlo Park, Calif.
SURVEY OF NATURAL FOOD SUBSTANCES WHICH MODIFY

FITTING.
Interim rept.,
by J. P. Falvey. 15 June 62, 13p. incl. illus. table (NRL rept. no. 5788; NAREC ref. no. 26)
Unclassified report

DESCRIPTORS: *Least squares method, *Curve fitting, *Digital computers. Programming, Data processing systems.

A program has been written for a high speed digital computer NAREC which will determine the polynomial of degree 23 or less which best fits, in the least square error sense, a set of as many as 4863 data points. (Author)

AD-277 948 Div. 15, 30
(TISTP/JW) OTS price $3.60

Stanford Research Inst., Menlo Park, Calif.
A TEST FOR LINEAR SEPARABILITY AS APPLIED TO SELF-ORGANIZING MACHINES,
by Richard C. Singleton. May 62, 29p. incl. illus. 20 refs.
(Contract Nonr-343800)
Unclassified report

Presented at the Conference on Self-Organizing Systems, held May 22-24, 1962, Chicago, Ill.

DESCRIPTORS: *Linear programming, *Probability. Matrix algebra, Binominls, Sequential analysis, Vector analysis, Mathematical logic.

Threshold logic elements are widely used in self-organizing machines, as a means of separating binary patterns into two categories. The question of whether or not two given sets of binary patterns can be separated with a single threshold logic element is of considerable interest, since training by weight adjustment can succeed only for those sets of patterns which are separable. In investigating this problem, it is convenient to consider the binary patterns as vertices of the unit n-cube. If an (n-1)-dimensional hyperplane can be passed through the cube in such a way that the two sets of vertices lie on opposite sides of the plane, the two sets are said to be linearly separable. The corresponding two sets of binary patterns can then, and only then, be distinguished by a single threshold logic element. This report presents a new test for linear separability. The two sets of binary patterns are combined in a matrix, and a sequence of reductions applied to this matrix to obtain a smaller matrix to be solved as a linear programming or game problem. (Author)

16. MEDICAL SCIENCES

AD-277 578 Div. 16
(TISTB/CCH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
ALGAL NUTRITION. A REVIEW OF THE LITERATURE,
by John H. Lancaster and Robert G. Tischer.
Jan 62, 8p. 66 refs. (Rept. no. 61-51)
Unclassified report

DESCRIPTORS: *Algae - Nutrition, *Metabolism - Chemical elements, *Space flight - Food. Waste gases, Sewage.

All species of algae require the elements carbon, hydrogen, oxygen, nitrogen, and magnesium in fairly large amounts. Requirements for potassium, iron, phosphorus, copper, zinc, boron, manganese, calcium, molybdenum, and sulfur have been demonstrated in various algae. Cobalt has been found to be associated with nitrogen metabolism in blue-greens. These elements, with the exception of potassium and sulfur, are required only in trace amounts. In addition to these trace elements, certain others, including antimony, arsenic, tin, beryllium, germanium, iodine, lead, nickel, rubidium, tungsten, vanadium, silver, bismuth, and gold have been found in algal cells, but no essentiality or function has as yet been discovered for them. The various nutrient substances, especially the trace elements, often support each other in their metabolic functions through interaction. (Author)

AD-277 634 Div. 16
(TISTB/AW) OTS price $3.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
RADIOBIOLOGIC EXPERIMENTS IN DISCOVERER SATELLITE XVIII.
Mar 62, 38p. incl. illus. tables. refs.
Unclassified report

DESCRIPTORS: *Radiobiology, *Dosimeters, *Radiation effects - Cells (Biology). Solar flares, Spores, Cosmic rays, Detectors, Photographic emulsions, Microorganisms, Space flight.

This report includes:
PHYSICAL DESCRIPTION OF THE FLIGHT, by George W. Crawford and Irving Davis. Mar 62 (Rept. no. 62-39)

DOSE MEASUREMENTS AND IDENTIFICATION OF PARTICLES, by George W. Crawford, Gerrit L. Hekhuis, and Calvin R. Dexter. (Rept. no. 62-40)

PHYSICAL DOSIMETRY, by Joseph S. Pizzuto and Charles M. Kohr. (Rept. no. 62-41)

PHYSIOLOGIC CHANGES OBSERVED IN CLOSTRIDIUM SPOROGENES, by Irving Davis, Thomas L. Roberts, and Sylvester Lassiter. (Rept. no. 62-42)

THE EFFECT OF SPACE FLIGHTS ON LIVING HUMAN CELLS ABOARD DISCOVERER XVIII, by Allan A. Katzberg. (Rept. no. 62-43)

PRIMARY CULTURES OF CHICK EMBRYO BRAIN TISSUE, by John E. Prince. (Rept. no. 62-44)

NUCLEAR EMULSION STUDIES, by John E. Hewitt and Marion M. Campbell. (Rept. no. 62-45)

EFFECT OF COSMIC RADIATION ON THE IN VITRO COMBINING CAPACITY OF ANTIGEN AND ANTIBODY (DISCOVERER XVIII), by Jimmie Lee Flume. (Rept. no. 62-46)

AD-277 644 Div. 16
(TISTB/AW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE EFFECT OF PURE OXYGEN INHALATION ON THE LUNGS AND HEART OF WHITE RATS,
by I. S. Balakhovskiy, A. R. Mansurov, and V. I. Yazdovskiy. 17 May 62, 8p. incl. illus. 10 refs.
(Trans. no. FTD-TT-62-772 from Byullenten' Eksperimental'noy Biologii i Meditsiny 53:43-47, 1962)
Unclassified report

DESCRIPTORS: *Oxygen poisoning. Heart, Lungs, Rats, Physiology, Pathology, Blood vessels, Toxicity, Electrocardiography, X-ray photography.

DESCRIPTORS: *Steel - Transformations, *Austenite, *Martensite, Decomposition, Heat treatment, Microstructure, Recoilless rifles.

The isothermal transformation characteristics of two heats of 4330V (MOD + Si) steel were investigated by means of the metallographic method. Both heats are deep hardening, the hardenability being limited by the start of the bainite reaction. The isothermal transformation diagram indicates that this material may be suitable for ausforming, but not particularly suited to marquenching operations. The start of bainite transformation varied within the compositional limits of the 2 heats of steel investigated. This would indicate that careful control of the composition would be necessary to achieve a high degree of uniformity of mechanical properties after heat treatment. (Author)

AD-277 672 Div. 17
(TISTM/TCG) OTS price $1.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
X-RAY STUDY OF ORDERING PROCESSES IN QUENCHED Cu3Au,
by M. A. Shields and R. Feder. May 62, 12p. incl. illus. (Memo. rept. no. M62-22-1)
Unclassified report

DESCRIPTORS: *Copper alloys, *Gold alloys, *Molecular association, *Reaction kinetics, Intermetallic compounds, Crystal structure, Microstructure, Lattices, Heat treatment, Crystallization, Temperature, Growth, X-ray diffraction analysis, Electrical properties, Resistance, Alloys, Solid state physics.

The kinetics of ordering in Cu3Au were studied as a function of quench temperature. These studies indicate that the rate of ordering is related to the temperature of quench, being more rapid the higher the temperture. A significant aspect of the results is the profile of the X-ray line used to observe the ordering process, its nonsymmetric shape indicating that the process did not proceed homogeneously. It is suggested that this might be a result of the high degree of disorder quenched in, which permitted the nuclei present to grow to unexpectedly large dimensions before encountering other domains. The suggested employment of the order-disorder process to monitor thermal history is not restricted to Cu3Au, but would be as applicable to other alloys exhibiting order-disorder transformations. (Author)

AD-277 795 Div. 17, 25
(TISTM/TCG) OTS price $1.25

Manufacturing Labs., Inc., Cambridge, Mass.
DISLOCATIONS AND PLASTIC BEHAVIOR OF IRON SINGLE CRYSTALS.
Final rept., 1 Mar 59-30 Sep 61 on Solid State Research and Properties of Matter.
Apr 62, 35p. incl. illus. tables, 6 refs.
(Contract AF 33(616)6348, Proj. 7021)
(WADD TR 61-145, pt. 2)
Unclassified report

DESCRIPTORS: *Iron, *Single crystals - Mechanical properties, *Creep. Growth, Crystallization, Elasticity, Plasticity, Stresses, Polymers, Crystals, Production.

Research is being conducted to determine the behavior of imperfections during plastic deformation of high purity highly perfect single crystals of Fe. Equipment and techniques were developed for growing large single crystals and obtaining accurate, quantitative measurements of the behavior of imperfections during plastic straining. The four main accomplishments of the present program are: the growth of highly perfect Fe single crystals, the measurement of crystal perfection as a function of plastic strain by rocking curve measurements, the measurement of the stress-strain relationship for highly perfect Fe single crystals, and the comparison of the stress-strain relationship with the etch pit and rocking curve measurements. Possible dislocation interpretations of the observed data are presented. (Author)

AD-277 797 Div. 17, 12
(TISTM/TCG) OTS price $.50

Directorate of Engineering Test, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
ENERGY ABSORPTION OF A SPECIFIC ALUMINUM HONEYCOMB.
Final rept.,
by Edward H. Schell. Mar 62, 12p. incl. illus. table, 1 ref.
(Proj. 7222)
(ASD TR 61-726) Unclassified report

DESCRIPTORS: *Aluminum, *Honeycomb cores, *Vibration isolators. Absorption, Energy, Dynamics, Stresses, Sandwich construction, Structures, Re-entry vehicles.

One configuration of an aluminum honeycomb energy absorber has been tested under conditions of varying velocity. A curve of energy per unit volume versus velocity is presented to show dynamic variance. The dynamic stress level and volume efficiency of the material are also presented. The appendices give a simple design procedure. (Author)

AD-277 800 Div. 17, 25
(TISTM/TCG) OTS price $2.75

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
RESEARCH ON VACUUM EVAPORATED AND CATHODE SPUTTERED THIN FILMS.
Final rept., 15 Apr 60-1 July 61,
by Richard B. Belser and William E. Woolf.
Apr 62, 109p. incl. illus. tables, 31 refs.
(Contract AF 33(616)6379, Proj. 4150)
(WADD TR 60-381, pt. 2)
Unclassified report

DESCRIPTORS: *Thin films - Processing, *Metal films. Metals, Indium compounds, Antimonides, Growth, Vapor plating, Single crystals, Crystal structure, Microstructure, Physical properties, Electrical properties, Refractory materials, Vacuum apparatus, Electron microscopy, X-ray diffraction analysis, Fluorescence, Copper, Silver, Gold, Iron, Nickel, Lead, Indium, Antimony.

Over 275 metal film specimens were deposited on single crystal substrates of NaCl, MgO, or LiF and examined for the structures of the resulting films. Substrate temperatures were maintained at selected levels in the range 25 to 900 C and deposition rates by vacuum evaporation have ranged from about 2 to 6,000 Angstroms/sec. Films of Cu, Ag, Au, Fe, Ni, Pb, In, Sb, and InSb were studied. Cu films were predominantly parallel oriented with respect to a cube face of the single crystal substrate whether deposited on NaCl or MgO in the temperature range 300 to 800 C. Films of Ni and Fe also appeared to be parallel oriented. Fe films on NaCl were damaged by

Division 17 - METALLURGY

RESPONSE TO RADIATION.
Rept. no. 14 (Final), 15 Jan 60-31 Aug 61,
by Gordon W. Newell, W. A. Skinner, and
Phyllis Havens. 12 Jan 62, 23p. incl. illus.
tables, 7 refs.
(Contract DA 19-129-qm-1547, Proj. 7-84-13-002A)
Unclassified report

DESCRIPTORS: *Radioprotective drugs. Radiological dosage, Radiobiology, Food, Laboratory animals, Gamma rays, Diet, Vitamins, Vegetables, Fractionation, Beets, Carrots, Effectiveness, Survival.

Whole-body gamma-radiation doses of 350-390 r resulted in 87 to 94 percent mortality within 30 days for guinea pigs fed a bran-oat, corn oil, vitamin A, and vitamin C diet. Supplements of dehydrated alfalfa and fresh broccoli, either alone or in combination, reduced mortality to a range of 20-45 percent. The following supplements provided borderline to marked radioprotective activity: a complete vitamin mixture, beta-carotene, a water extract of dehydrated alfalfa, an alcohol-soluble fraction of the water extract, and a neutral-components fraction of the water extract. Food substances that gave no radiation protection included: a synthetic basic mineral mixture, casein, alfalfa ash, vitamin E, vitamin A, hesperidin, and coumestrol. (Author)

17. METALLURGY

AD-277 569 Div. 17, 27
(TISTM/JSM) OTS price $2.00

Naval Research Lab., Washington, D. C.
RESISTANCE TO CRACK PROPAGATION OF HIGH-STRENGTH SHEET MATERIALS FOR ROCKET MOTOR CASINGS,
by J. E. Srawley and C. D. Beachem. 31 May 62, 69p. incl. illus. tables, 22 refs. (NRL rept. no. 5771)
(Proj. TB4-004)
(WAL TR 310.24/4) Unclassified report

DESCRIPTORS: *Fracture (Mechanics) - Test methods, *Steel - Fracture (Mechanics), *Titanium alloys - Fracture (Mechanics), *Rocket cases - Materials. Sheets, Tensile properties, Mechanical properties, Stresses, Density, Vanadium alloys, Aluminum alloys, Molybdenum alloys, Chromium alloys, Nickel alloys, Austenite, Grains (Metallurgy).

The ratio of the fracture strength of a standardized center-crack-slotted tensile specimen to the yield strength of the material was employed as a comparative measure of crack propagation resistance. Fracture strength ratios and tensile properties were determined at various levels of yield strength for nine commercial steels, four titanium alloys, and 26 experimental steels, including six ausforming compositions. The highest fracture strength ratios, in relation to the ratio of yield strength to density, were obtained with titanium alloys, notably 16V-2.5Al. The steels were markedly inferior at ratios of yield strength to density exceeding 900,000. All materials showed a limiting trend for fracture strength ratio to decrease with increasing strength level. High yield strengths were obtained in ausrolled steels, but the fracture strength ratios followed essentially the same trend as for quenched and tempered steels. Indications of effects of composition in quenched and tempered low-alloy steels were obtained and were related, in part, to prior austenite grain size and to temperability. Vanadium (0.2%) was specifically beneficial, and Mo and Cr were also beneficial. (Author)

AD-277 599 Div. 17, 27
(TISTM/REB) OTS price $1.10

Aerojet-General Corp., Azusa, Calif.
INVESTIGATION OF STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS.
Informal progress rept. no. 16, 1-31 May 62.
25 June 62, 2p. tables (Rept. no. L0414-01-16)
(Contract DA 04-495-ORD-3069)
Unclassified report

DESCRIPTORS: *Alloys - Corrosion, *Steel - Corrosion, *Stainless steel - Fracture (Mechanics), *Titanium alloys - Stresses. Rocket cases, Materials, Coatings.

Both bent-beam and U-beam specimens were employed in evaluating the susceptibility to environmental stress-corrosion cracking of unwelded samples of the candidate alloys. A comprehensive summary of the test results is given. The bent-beam specimens were stressed to 75% of the yield strength, and the U-bend specimens were bent over 12T- and 24T-diameter mandrels. The specimens were then exposed to environments representative of those that would exist during some phase of the manufacturing, testing, and long-term storage of solid-rocket-motor chambers. These tests were completed, and the data accumulated is quite indicative of which alloys are susceptible to stress-corrosion cracking in the environments tested and of which environments induce stress-corrosion cracking of the alloys tested. Three protective coatings are currently being evaluated, two of epoxy-type and one a urethane-type coating. A summary of the environmental test data accumulated to date is given. (Author)

AD-277 629 Div. 17, 22
(TISTM/REB) OTS price $6.60

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT OF AN AIR-HARDENABLE CAST STEEL FOR THICK SECTIONS.
Summary rept., 14 Feb 61-30 Apr 62.
6 June 62, 53p. incl. illus. tables (Rept. no. ARF 2214-4)
(Contract DA 11-022-ORD-3686, Proj. TW414)
Unclassified report

DESCRIPTORS: *Cast steel. Hardening, Tensile properties, Mechanical properties, Hardenability, Impact shock, Armor plate, Heat treatment, Air.

A program was conducted to develop a steel alloy composition suitable for cross sections of up to 5 in. thickness which can develop adequate toughness down to -40 F after air hardening and tempering. As a result of systematic variations in alloy content, it has been shown that there are upper limits for each of the major elements in common use. Moreover, a critical carbon content for optimum toughness exists. From all of this, two preferred chemistries were chosen which in a 5-in. section are capable of providing 18-20 ft-lb impact strength at -40 F and a tempered hardness after air hardening of 22-24 Rc. (Author)

AD-277 671 Div. 17, 25
(TISTM/REB) OTS price $1.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
THE ISOTHERMAL TRANSFORMATION CHARACTERISTICS OF 4330V (MOD + SI) STEEL,
by J. W. Forney. Apr 62, 20p. incl. illus. table, 6 refs. (Rept. no. R-1627)
(Proj. 50201008)
Unclassified report

OXYGEN AND AIR,
by G. J. Casaletto, L. H. Gevantman, and J. B. Nash. 8 May 62, 22p. incl. illus. table, 11 refs. (NRDL TR-565)
Unclassified report

DESCRIPTORS: *Tritium, *Oxidation. Radiation effects, Oxygen, Air, Reaction kinetics, Water vapor, Water, Tritium oxide.

The rate of self-radiation oxidation of tritium has been studied in atmospheres of oxygen and air by direct analysis of products as a function of time. Second-order dependence on tritium concentration was observed below 1 mc/ml. Rate constants were determined to be 1.2 x 1/1000 ml/mc-hr in oxygen and 0.62 x 1/1000 ml/mc-hr in dry air. The reaction rate was found to be independent of oxygen concentration and surface area at constant total pressures above 100 mm but to drop off sharply below this value. The rate in oxygen is increased threefold in the presence of water vapor. The rate in atmospheric air, although poorly reproducible, is essentially the same as in dry air. (Author)

AD-277 559 Div. 20
(TISTP/WH) OTS price $11.50

Illinois U., Urbana.
SOME CORRECTIONS TO PARTIAL WAVE DISPERSION RELATIONS FOR PION PHOTOPRODUCTION,
by John McKeen McKinley. May 62, 153p. incl. illus. tables, 67 refs. (Technical rept. no. 38)
(Contract Nonr-183405)
Unclassified report

DESCRIPTORS: *Pions, *Meson scattering. Mesons, Nucleons, Quantum mechanics, Meson cross sections, Photonuclear reactions.

The exact one dimensional dispersion relations for partial wave amplitudes of pion-nucleon scattering and of pion photoproduction on nucleons were derived and compared. A non-constant comparison function must be introduced into the relationship between the scattering partial wave amplitude which is dominant at low energies and the corresponding photoproduction partial wave amplitude, in order that each amplitude obeys its own exact dispersion relation at the same time that the two amplitudes are related by the unitarity condition. The results of experimental determinations of pion-nucleon scattering phase shifts were compiled, and the coefficients of interpolation formulae for the phase shifts were evaluated. The experimental results of photoproduction of neutral and of positive pions on protons at energies up to 500 Mev were compared to calculated cross sections for various combinations of choice of phase shifts and inclusion of the comparison function. There was no overwhelming indication either for or against the inclusion of the comparison function. (Author)

AD-277 613 Div. 20
(TISTM/REB) OTS price $1.60

Florida U., Gainesville.
THE NUCLEAR PROPERTIES OF RHENIUM.
Quarterly technical progress rept. no. 10, 8 Mar-8 June 62,
by R. A. Karam, T. F. Parkinson and others.
8 June 62, 12p. illus. table, 7 refs.
(Contract NOa(s) 60-6021-c)
Unclassified report

DESCRIPTORS: *Rhenium. Nuclear reactions, Neutron cross sections, Neutron flux density, Isotopes, Radiochemistry.

The (neutron, 2 neutron) cross sections for Re-187 and Re-185 were measured with 14.1 Mev neutrons from the T(deutron, neutron)He4 reaction. The standard used was Au-197. Since the (n,2n) reaction with Au-197 results in Au-196 and Au-196 (excited level) with half-lives of 5.3 days and 14 hours, respectively, the cross section for Au-196 was used as the standard. The cross section for Re-187(n,2n)Re-186 was found to be 1.44 ± 0.41 barns. An upper limit for the Re-185(n,2n)Re-184 cross section was found to be 1.80 ± .60 barns. The decay of Au-196 (excited level) proceeds via isomeric transition to Au-196. (Author)

AD-277 627 Div. 20
(TISTP/WH) OTS price $1.60

Paris U., France.
WEAK-ELECTROMAGNETIC AND PIONIC DECAY OF HYPERONS,
by Jean Nuyts. 1 Apr 62, 16p. incl. tables, refs. (Technical note no. 5)
(Contract AF 61(052)474)
(AFOSR-2933) Unclassified report

DESCRIPTORS: *Hyperons, *Radioactive decay. Pions, Electromagnetic waves.

Using the pole approximation for the weak-electromagnetic and pion decays of hyperons, the relative number of experimental (measured and to be measured) and theoretical parameters are discussed. This yields the minimum conditions to test the theory. (Author)

AD-277 636 Div. 20
(TISTP/WH) OTS price $1.60

Stanford U., Calif.
THE K(+) - pi(+) + e(+) + e(-) DECAY,
by M. Baker and S. L. Glashow. June 62, 12p. incl. illus. (Technical note no. 58)
(Contract AF 49(638)388)
(AFOSR-2563) Unclassified report

DESCRIPTORS: *Radioactive decay, *Mesons, *Pions, *Nuclear reactions. Pair production.

The decay mode of the charged K meson into a charged pion and an electron-positron pair is calculated. It has previously been estimated to occur once in ten million events. An occurrence of one in one hundred thousand events is estimated here. The calculation is only an estimate, for the branching ratio depends upon the (experimentally unknown) pion and kaon form factors, and upon the relative role played by vector and axial-vector weak interaction. (Author)

AD-277 638 Div. 20
(TISTP/WH) OTS price $4.60

Stanford U., Calif.
BOSON-LIKE BEHAVIOR OF PAIRS OF FERMIONS I,
by Amnon Katz. June 62, 37p. incl. illus. (Technical note no. 56)
(Contract AF 49(638)388)
(AFOSR-2564) Unclassified report

DESCRIPTORS: *Superconductivity, *Nuclear physics, *Quantum mechanics. Theory, Pair production.

The binary collision approximation is applied to the perturbation expansion of the thermodynamic potential. It is found that bound pairs behave as free bosons at low temperature and low density. At higher densities they behave as interacting bosons. (Author)

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stress or humidity. Parallel orientation for films of Ag, Au, and Pb proved difficult. These studies indicated a strong dependence of epitaxy on a chemical interaction between the substrate and the deposit which appears similar to that occurring in chemisorption. (Author)

AD-277 910 Div. 17
(TISTM/TCG) OTS price $1.60

Climax Molybdenum Co. of Michigan, Detroit.
INVESTIGATION OF MOLYBDENUM- AND TUNGSTEN-BASE ALLOY SHEET MATERIALS.
Quarterly rept. no. 4, 25 Feb-24 May 62,
by Gordon D. McArdle, Robert Q. Barr, and M. Semchyshen. 24 May 62, 9p. incl. tables.
(Contract NOw 61-0581-d)
Unclassified report

DESCRIPTORS: *Molybdenum alloys - Mechanical properties, *Tungsten alloys - Mechanical properties, *Sheets - Processing. High temperature research, Tensile properties, Hardness, Heat treatment, Crystallization, Elasticity, Transition temperature, Creep.

Elevated-temperature tensile tests were conducted on several Mo- and W-base sheets which had been rolled to size in air on conventional mill equipment. Hardness measurements, recrystallization data, and bend transition temperature determinations were obtained on sheets of similar analyses rolled in the InFab facility. (Author)

AD-277 933 Div. 17
(TISTM/BRW) OTS price $14.00

North American Aviation, Inc., Columbus, Ohio.
DOD HIGH STRENGTH TITANIUM ALLOY SHEET RESEARCH PROGRAM.
Progress rept. no. 17, 31 Jan-1 May 62,
by D. E. Myers. 31 May 62, 212p. incl. illus. tables, 3 refs. (Rept. no. NA57H-527-17)
(Contract NOa(s) 57-785-d)
Unclassified report

DESCRIPTORS: *Titanium alloys - Mechanical properties, *Sheets. Aluminum alloys, Tin alloys, Zirconium alloys, High temperature research, Creep, Deformation, Tensile properties, Fatigue (Mechanics), Stresses, Machining, Welding, Contamination, Processing, Alloys, Tests, Metallurgical analysis, Surface properties, Chemical analysis, Arc welding, Electric welding, Resistance.

Metallurgical, formability, joining and machining data for the 5Al-5Sn-5Zr and 7Al-12Zr super alpha-Ti sheet alloys are presented. The evaluations are complete with the exception of creep studies at 900 and 1100 F, and fabrication sequences (stress and contamination studies) investigations. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-277 831 Div. 18, 30
(TISTP/FR) OTS price $3.60

Operations Evaluation Group, Office of Naval Operations, Washington, D. C.
MODEL AND COMPUTER PROGRAM FOR AN ATTACK ON AN EVADING SUBMARINE.
Interim research memo.,
by S. H. Howe, J. F. Hammerle, and R. D. Mason, Jr. 8 June 62, 35p. incl. illus. 1 ref. (IRM-18)
Unclassified report

DESCRIPTORS: *Antisubmarine warfare. Mathematical analysis, Probability, Digital computers, Programming.

A model and computer program for computing kill probabilities for an attack on an evading submarine are given. Various tactical situations and delivery methods can be treated by the model, which has available a wide range of input parameters. The model can be applied to a variety of situations: helicopter or ship vectoring another helicopter or aircraft to the attack, ASROC attack, etc. The weapon may be a torpedo or nuclear depth bomb. By way of illustration to explain the model, the case where a ship vectors an aircraft to the attack is treated in detail. (Author)

AD-277 944 Div. 18
(TISTB/AW) OTS price $2.60

System Development Corp., Santa Monica, Calif.
MILITARY PLANNING BY RESOURCE ALLOCATION METHODS,
by James L. Taylor and John E. Walsh. 27 June 62, 28p. incl. table, 1 ref. (Rept. no. SP-480/000/01)
(In cooperation with Northrop Corp.)
Unclassified report

DESCRIPTORS: *Warfare. Simulation, Games theory, Logistics, Weapons, Targets, Selection, Distribution, Effectiveness.

Military planning is treated as a resource allocation problem, where this planning refers to the production and use of types of weapons that have already been developed. The situation can be conveniently phrased in terms of resource allocation with respect to some specified types of weapons that are to be used to attack some given targets. Consider all combinations of target and type of weapon. The problem is to distribute the total available resources (for production and use of weapons) among these combinations in such a manner that the value of the targets surviving the attack is minimized. A deterministic model of an exceedingly flexible nature is developed for representing situations of this nature. Despite the generality allowed, a rather easily applied iterative method is obtained for solving the allocation of resources problem. Some numerical results are presented for a special case. (Author)

19. NAVIGATION

No Entries

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-277 509 Div. 20, 4
(TISTM/JSM) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
THE SELF-RADIATION OXIDATION OF TRITIUM IN

HIGH PRESSURE.
Final rept.,
by G. H. Wolfe and L. Reiffel. 10 May 62, 21p. incl. illus. table, refs. (Rept. no. ARF 1183-4)
(Contract AF 49(638)1010)
(AFOSR-2641) Unclassified report

DESCRIPTORS: *Neutron diffraction analysis, *Hydrostatic pressure, *Feasibility studies, *Rubidium compounds. Iodides, Chlorides, Neutron beams, High pressure research, Pressure vessels, Polymorphism, Phase transitions, Alkali metals, Halides, Crystals, Cadmium, Crystal holders, Test methods.

Studies were conducted to establish the technical feasibility of obtaining neutron diffraction data on specimens under high hydrostatic pressure. Laue patterns of RbI and RbCl were obtained at pressures up to 80,000 psi in a uniquely designed pressure bomb. The RbI transformed completely at 60,000 psi, but only an incomplete transition was observed in RbCl. There are indications of possible differences in the transformation mechanism for these materials. It is concluded that neutron Laue patterns are feasible at pressures up to 80,000 psi and that the method could be extended to perhaps 150,000 psi. (Author)

AD-277 900 Div. 20, 6, 16, 18, 22
(TISTB/AW) OTS price $2.50

Armed Services Technical Information Agency, Arlington, Va.
RADIOLOGICAL WARFARE AND NUCLEAR EXPLOSIONS. AN ASTIA REPORT BIBLIOGRAPHY,
comp. by John A. Baldwin and Abbott Wainwright. 1 July 62, 120p. 717 refs.
Unclassified report

DESCRIPTORS: *Bibliography - Nuclear explosions, *Nuclear explosions - Bibliography, *Nuclear warfare, *Radiological warfare. Blast, Civilian defense systems, Decontamination, Detection, Flames, Radiation alarms, Radiation counters, Radioactive fall-out, Sampling, Shelters, Thermal radiation, Nuclear weapons.

This bibliography was prepared by ASTIA in response to frequent inquiries on the hazards and safety aspects of radiological warfare and nuclear explosions. Citations are included for reports cataloged by ASTIA from 1953 through June 1962, and are restricted to unclassified, unlimited references. References are arranged alphabetically by subject areas pertaining to blast effects, civil defense, fall-out patterns and prediction, nuclear warfare, protection, radiation effects, radiation meters, radiobiological effects, sampling, thermal radiation and fire, and weapons. These subject areas are further subdivided into more specific topics. The classified section of this bibliography appears as a secret document, identified as AD-330 030.

AD-277 922 Div. 20
(TISTP/WH) OTS price $1.60

Johns Hopkins U., Baltimore, Md.
(No title).
Final rept., 1 July 56-31 Dec 61.
June 62, 8p. refs.
(Contract AF 18(603)143)
(AFOSR-2661) Unclassified report

DESCRIPTORS: *Cosmic rays, *Mesons, *Photographic emulsions, *Hyperons, *Ionization chambers. Research program administration, Helium, Deuterium.

Work accomplished in high energy physics at the Johns Hopkins University is summarized. The nuclear emulsion program, helium bubble chamber work, and deuterium and new particle experiments are discussed.

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-277 553 Div. 22
(TISTW/RD) OTS price $1.60

Diamond Ordnance Fuze Labs., Washington, D. C.
CW FUZE SIMULATOR - TELEMETRY DESIGN,
by Harry F. Shaw and Charles F. Perry. 10 May 62, 18p. incl. illus. refs. (Rept. no. TR-1006)
(DOFL Proj. 44100)
Unclassified report

DESCRIPTORS: *Fuzes - Simulation, *Simulation - Fuzes, *Telemeter systems. High frequency, Telemetering transmitters, Frequency modulation, Design.

A high-frequency telemeter transmitter has been developed for use in a CW fuze simulator. The unit features wide frequency response, high input impedance, and good frequency stability. Satisfactory performance has been obtained in laboratory and field tests over a wide range of temperature. (Author)

AD-277 729 Div. 22, 9, 30
(TISTW/EET) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
A GAS SAMPLING DEVICE AND ITS APPLICATION TO THE MARK 133 MODEL 0 IGNITER,
by Everett M. Bens. May 62, 12p. incl. illus. tables, 4 refs. (NOTS TP 2834)
(NAVWEPS rept. no. 7825)
Unclassified report

DESCRIPTORS: *Igniters, *Gas generating systems, *Gases - Sampling. Measurement, Mass spectrometers, Infrared spectroscopy, Analysis, Propellants, Decomposition, Stability, Adhesives, Epoxy resins, Carbon dioxide, Carbon compounds, Monoxides, Dioxides, Nitrogen compounds, Oxygen, Oxides, Argon.

A sampling device was developed for the collection of small (0.5 cc) air-free samples of gas from bulged igniters that may have application for sampling gases in other sealed systems. The components of the gas collected were identified by IR and mass spectrometric analysis and were found to be the same as those of the gases liberated from the reaction of the adhesive and sustainer used in the igniter. Additional study confirmed this conclusion. (Author)

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AD-277 639 Div. 20
(TISTP/WH) OTS price $2.60

Stanford U., Calif.
UNITARITY AND HIGH ENERGY INELASTIC SCATTERING,
by M. Baker and R. Blankenbecler. June 62,
23p. incl. illus. table (Technical note no. 60)
(Contract AF 49(638)388)
(AFOSR-2640) Unclassified report

DESCRIPTORS: *Inelastic scattering, *Integral transforms, *Nucleons.

The effect of approximately enforcing the unitarity requirement on peripheral collision-type approximations is discussed. A matrix formulation of the Fourier-Bessel representation of the scattering amplitude is utilized which automatically satisfies unitarity at high energies. Results indicate that quantitative agreement of the peripheral collision approximation with experiment can be accidental since the corrections due to unitarity take the same form and magnitude as the phenomeno logical form factors depending only on the momentum transfer which are introduced to account for off-mass-shell effects. Three models are discussed, and one of them has the behavior characteristics of a Regge trajectory. (Author)

AD-277 677 Div. 20, 16
(TISTB/AW) OTS price $.75

Office of Naval Research, Washington, D. C.
AN EVALUATION OF THE NEED FOR FILTRATION SYSTEMS TO PROTECT SHELTERED PERSONNEL FROM RADIOACTIVE FALLOUT.
May 62, 19p. incl. refs. (ONR rept. no. ACR-72)
Unclassified report

DESCRIPTORS: *Radioactive fall-out, *Radiological contamination, *Radiological dosage. Particulate filters, Civilian defense systems, Accidents, Radiation alarms, Particles, Physiology, Radioactive decay cbnstant, Radioactive isotopes, Radiological warfare, Radiation injuries, Shelters, Fission product poisoning, Radiation hazards.

The hazards associated with situations involving acute radioactive contamination of the atmosphere are reviewed and the need for air filtration systems to protect personnel in various types of structures in such situations is evaluated. This report concerns only radioactive contamination of the air and makes no attempt to evaluate the hazards associated with biological and chemical types of contamination. The material was drawn from the following sources: (a) the open literature and, to a lesser extent, the classified literature; (b) interviews and visits to installations; and (c) personal experience. (Author)

AD-277 697 Div. 20, 2
(TISTA/VGW) OTS price $2.60

Aerospace Corp., El Segundo, Calif.
SPACE PHYSICS PROGRAM. NEUTRON-GAMMA RAY INSTRUMENTATION EXPERIMENT FOR LUNAR SURFACE COMPOSITION ANALYSIS.
Semiannual technical rept., 1 July-31 Dec 61,
by E. F. Martina. 28 Feb 62, 15p. incl. illus.
(Rept. no. TDR-930(2260-31)TR-1)
(Contract AF 04(647)930)
(DCAS TDR 62-76) Unclassified report

DESCRIPTORS: *Moon - Geophysical prospecting, *Lunar probes - Instrumentation, *Gamma neutron reactions. Gamma ray spectroscopy, Particle accelerators, Deuterium, Pressure, Servo systems, Deuteron bombardment, Tritium, Neutron flux density, Neutron scattering, Sand, Gamma ray spectrometers, Design, Tests, Chemical analysis.

An analysis technique capable of determining the nature and relative abundance of constituent elements at remote places, such as the lunar and planetary surfaces, is described. Details on accomplishments to date in developing a prototype instrument for analysis of the lunar surface are given. (Author)

AD-277 738 Div. 20
(TISTP/WH) OTS price $8.60

Palmer Physical Lab., Princeton U., N. J.
COSMIC RAY AND ELEMENTARY PARTICLES GROUP.
30 June 62, 66p. illus. tables, 54 refs. (Technical rept. no. 31)
(Contract Nonr-185806)
Unclassified report

DESCRIPTORS: *Cerenkov radiation, *Radiation counters, *Cosmic rays. Focusing.

A perspective of the role of focusing Cerenkov counters in high energy physics is given. The excellent time resolution and good velocity resolution of these counters are discussed with respect to present experimental methods, recent experiments, and future trends in this field. The basic principles of their operation and the limitations to their velocity resolution are considered in detail. Several designs for differential gas Cerenkov counters are given on the basis of present working models. These designs provide incident beams of identified particles up to gamma = 100 and 200 for use in experiments such as the measurement of total cross sections once the corresponding momenta become available. (Author)

AD-277 837 Div. 20, 25
(TISTM/JSM) OTS price $.75

Naval Research Lab., Washington, D. C.
DOSIMETRY BY SOLID STATE DEVICES.
Interim rept.,
by F. H. Attix. 15 June 62, 21p. incl. tables,
120 refs. (NRL rept. no. 5777)
Unclassified report

DESCRIPTORS: *Dosimeters. Solid state physics, Luminescence, Ionization, Semiconductors, Glass, Phosphate glass, Plastics, Phosphors, Cadmium compounds, Sulfides, Selenides, Acrylic resins.

This report is a brief survey of material published on solid state dosimetry. A few dosimeters have more to offer in most of the following respects: they have been studied as dosimeters in considerable detail, preferably in more than one laboratory; and the materials and instruments necessary are readily available from commercial sources. In some cases, the complete dosimetry system can be bought as such from one or more suppliers. Techniques for using the dosimetry systems are simple and convenient. They are not seriously deficient in any of the desirable physical characteristics sought in a dosimetry system. The list of dosimeters best meeting these requirements includes: silver-activated phosphate glass, both with coloration and luminescence readout methods; cobalt-activated borosilicate glass; CaF2:Mn thermoluminescent dosimeter; and polymethylmethacrylate UV coloration. In addition, the silicon p-n junction, the CdS crystal, and the photovoltaic cell all offer promise as solid state dose-rate detectors. (Author)

AD-277 846 Div. 20, 25
(TISTM/TCG) OTS price $2.60

Armour Research Foundation, Chicago, Ill.
FEASIBILITY OF NEUTRON DIFFRACTION STUDIES IN

25. PHYSICS

AD-277 512 Div. 25, 8
(TISTP/GRW) OTS price $2.60

Polytechnic Inst. of Brooklyn, N. Y.
REFLECTION AND TRANSMISSION OF MICROWAVES AT A MOVING PLASMA INTERFACE IN A SHOCK TUBE,
by Simon H. Schwartz. May 62, 22p. incl. illus. 3 refs. (PIBAL rept. no. 750)
(Contract AF 30(602)2045, Proj. 5561)
(RADC TDR 62-265)
Unclassified report

DESCRIPTORS: *Shock tubes, *Microwaves, *Wave transmission. Propagation, Reflection, Electromagnetic fields, Plasma oscillations, Shock waves.

Microwave radiation is propagated from an antenna located at the downstream end of a shock tube and is partially reflected by the interface of the moving shock wave. The electromagnetic properties of this shock wave, i.e., its velocity, electron density, etc., can be determined by an analysis of the radiation field either behind or in front of the shock wave. The shock tube itself acts as a microwave cavity, which is coupled with the microwave transmission system. An analysis of the effects of the moving plasma on the distribution of electromagnetic field in the shock tube is presented. In particular, the effects of the shock velocity and the coupling of the tube with the microwave system are determined. (Author)

AD-277 523 Div. 25
(TISTP/FR) OTS price $6.60

Stanford U., Calif.
DYNAMIC BUCKLING OF COLUMNS,
by Bruno Hegglin. June 62, 55p. incl. illus. tables, 3 refs. (Technical rept. no. 3; SUDAER no. 129)
(Contract Nonr-22547)
Unclassified report

DESCRIPTORS: *Beams, *Buckling, *Deformation. Tests, Test equipment.

Experimental results of dynamic buckling tests of columns in which plastic deformation was expected to occur are given. The tests were performed in the same range of the dynamic similarity number as those at Polytechnic Institute of Brooklyn; however the similarity numbers were obtained with shorter columns and higher loading velocities to accomodate shorter columns and to provide more rigidity and reliability. As a consequence many components of the mechanical part and nearly the whole electrical part of the machine have been redesigned and new methods in recording were used. (Author)

AD-277 524 Div. 25
(TISTP/WH) OTS price $5.60

Stanford U., Calif.
THE MOTION OF A DISLOCATED CONTINUUM,
by Brian M. Lempriere. June 62, 46p. 30 refs.
(Technical rept. no. 2; SUDAER no. 128)
(Contract Nonr-22547)
Unclassified report

DESCRIPTORS: *Metals, *Mechanical properties, *Continuum mechanics, *Lattices, *Metallurgy.

A theory describing the mechanical properties of metals must include the methods of physics, of metallurgy and of applied mechanics. This unification is the primary object of the present work: starting from the physicists' analysis of a metal in terms of a lattice cell amenable to quantum mechanics, it is shown how the continuum geometry of modern dislocation theory can be developed. Some disagreement with existing formulations is found, and a greater degree of exactness is maintained for the sake of generality. An attempt is made to derive equations for the motion of a dislocated lattice (which is the real purpose of dislocation theory) by studying the motions of the geometry mentioned. Considerably more work on this theory is required to understand and apply the equations which have been developed. Two lines of study in associated fields which would prove valuable are the physics of the transition in atomic states responsible for dislocation motion and an experimental assessment of lattice configurations under typical conditions. (Author)

AD-277 527 Div. 25, 9
(TISTP/JW) OTS price $7.60

Sylvania Electric Products, Inc., Waltham, Mass.
THEORETICAL RESEARCH ON HYDROMAGNETIC WAVE PROPAGATION.
Final rept.
17 Feb 62, 1v. 60 refs. (Rept. no. F-1001-1)
(Contract AF 19(604)7487, Proj. 5631)
(AFCRL-62-153)
Unclassified report

DESCRIPTORS: *Wave characteristics, *Magnetohydrodynamics. Fluid flow, Viscosity, Compressible flow, Electrical conductance, Partial differential equations.

The elementary theory of hydromagnetic waves in an inviscid incompressible, perfectly conducting fluid of infinite extent, embedded in a uniform magnetic field, indicates their propagation is purely one-dimensional, along the magnetic lines of force, and hence without attenuation. The object is to investigate how this property is modified by the effects of compressibility, finite electrical conductivity, viscosity, and the combined effects of finite electrical conductivity and viscosity. Complexities are introduced one by one. The disturbance is specified in terms of vorticity and current density. It appears that the compressibility of a medium acts as a wave filter discriminating between components of vorticity and passing only those directed along the magnetic field. Dissipative effects introduce great mathematical difficulties. The partial differential equations governing these phenomena are of mixed type: hyperbolic-parabolic, and this indicates that the disturbances diffuse outward as they travel along magnetic lines of force. The symmetrical role played in these equations by the coefficients of kinematic viscosity and magnetic viscosity is outlined. Some mathematical analogies between magnetohydrodynamics and ordinary hydrodynamics are studied. Weber's transformation is extended to the potential vector of electrodynamics and the equation for the magnetic field is integrated in terms of Lagrangian variables of hydrodynamics. (Author)

AD-277 551 Div. 25, 6
(TISTA/VGW) OTS price $3.60

Diamond Ordnance Fuze Labs., Washington, D. C.
FUNDAMENTALS OF SPATIAL FILTERING,
by Josef Arthaber. 15 June 62, 38p. incl. illus. 108 refs. (Rept. no. TR-960)
Unclassified report

DESCRIPTORS: *Optical systems - Fourier analysis, *Electric filters - Mathematical analysis. Optical images, Frequency, Optical analysis, Analog systems.

The concept of spatial frequency, based on Fou-

23. PERSONNEL AND TRAINING

AD-277 945 Div. 23
(TISTB/MS) OTS price $1.60

System Development Corp., Santa Monica, Calif.
PROGRAMMED INSTRUCTION: A PERSPECTIVE,
by John E. Coulson. 27 June 62, 11p. 8 refs.
(Rept. no. SP-866)
Unclassified report

DESCRIPTORS: *Education - Test methods, *Programming - Training devices, *Teaching machines. Job analysis, Behavior, Learning.

A direction is suggested for future research in programmed instruction and for the application of this educational technique. The view is taken that programmed instruction must be considered in perspective among other educational techniques, each having its own advantages and disadvantages for specific requirements. Research should be directed toward the discovery of ways in which techniques of programmed instruction may be combined with other educational methods to optimize instruction for different tasks and for different student characteristics. If systematic relationships governing the effectiveness of different instructional procedures are to be discovered, an early step in the suggested research program will be an analysis of the task and student variables. A portion of this paper will be devoted to a consideration of one system of task analysis, and to a discussion of research problems developing from this analysis. First, however, it may be useful to review briefly a number of past trends in autoinstructional research and practice, and to consider how certain changes in the currently prevailing view of programmed instruction may facilitate future development of the field. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-277 651 Div. 24, 25
(TISTA/VGW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR DETERMINING THE RATE OF MOTION OF AN OPTICAL IMAGE IN SLIT-SHUTTER AND VERTICAL-SURVEYING AERIAL CAMERAS,
by V. P. Stel'makh. 20 June 62, 5p. incl. illus.
(Trans. no. FTD-TT-62-482 of Soviet Patent no. 132954 (652878/26), 30 Jan 1960)
Unclassified report

DESCRIPTORS: *Aerial cameras - Control systems, *Optical images - Motion, *Photographic film - Feed mechanisms. Design, Topographic cameras, Image converter tubes, Photomultipliers, Translations, USSR.

The familiar devices for determining the speed of the optical image in slit-shutter and vertical-surveying aerial cameras, and also for maintaining the speed of the aerial film at a value equal to the speed of the image of the ground objects, consist of an optical unit, an image converter, a delay service, a comparing stage, and an electrical executive mechanism. Such devices do not assure automatic control of the speed of the aerial film in the camera when the flight speed of the airplane varies. In the described device, this disadvantage is eliminated by using an optical unit made in the form of an objective with a light-proof diaphragm with openings, an image converter in the form of two cameras with photomultipliers, a delay device in the form of a magnetic drum, and an auto-correlator serving as the comparing stage. (Author)

AD-277 746 Div. 24, 8
(TISTA/VGW) OTS price $21.00

RCA Defense Electronic Products, Camden, N. J.
HIGH RESOLUTION DISPLAY MEDIA.
Final rept.,
by L. T. Sachtleben. 7 May 62, 362p. incl. illus. tables, 92 refs.
(Contract AF 30(602)2238, Proj. 4594)
(RADC TDR 62-233)
Unclassified report

DESCRIPTORS: *Optical images - Display systems, *Photochemical reactions - Luminescence, *Image intensifiers (Electronics). Optical systems, Cathode ray tubes, Optical materials, Optical analysis, Brightness, Visibility, Bibliography.

An extensive non-mathematical introductory discussion is given of factors involved in image quality, including aperture response and transfer characteristics. There follows a study of the properties of commercial translucent projection screen materials and specialized techniques, with a study of experimental screen materials made of optical fibers. Commercial screen brightness distribution is improved for a 90 degree audience by combining with a Fresnel lens. One of the fiber optics experimental materials approaches the performance of such a combination. If the Fresnel lens is not used with commercial materials, fiber optics materials may give substantially equal or better performance than the best commercial screens. Studies are reported of electroluminescent image intensifier panels and photochromic materials as display media. The present state of the art in fiber optics magnifiers is reviewed. A study is presented of other possible magnifiers of this type, and the problems that may be expected. Results are given of a research into the problems of providing a large viewing angle and maintaining high resolution in a fiber optics display structure, by terminating each individual cladded fiber in an optically isolated diffusing element. (Author)

AD-277 908 Div. 24
(TISTA/VGW) OTS price $3.60

Aeronautical Photographic Experimental Lab., Naval Air Development Center, Johnsville, Pa.
COMPARATIVE EVALUATION OF PANORAMIC CAMERA RECONNAISSANCE SYSTEMS.
Final rept.,
by Robert W. Tafel. 15 June 62, 26p. illus. tables (Rept. no. NADC AP-6204)
Unclassified report

DESCRIPTORS: *Aerial cameras - Design, *Aerial reconnaissance - Aerial cameras, *Rotating mirror cameras - Airborne. Rotating structures, Prisms (Optics), Photographic lenses, Optical systems, Wide field cameras, Military requirements, Effectiveness, Panoramic scanners.

A survey is made of current panoramic camera system designs which are classified into four basic types with further sub-grouping where applicable. These systems are analyzed for their potential applications in airborne use considering such factors as operational altitudes, recycle rates, scanning rates, focal lengths and installation requirements. The various system designs are compared primarily on the basis of their theoretical performance capability and to a lesser extent on actual performance results of the few developed prototypes on which data were available. (Author)

OF ELASTIC WAVE PROPAGATION IN A CYLINDER,
by Joseph Zemanek, Jr. Apr 62, 176p. incl. illus. tables, 42 refs. (Technical rept. no. 18)
(Contract Nonr-23348)
Unclassified report

DESCRIPTORS: *Elastic shells, *Stresses, *Wave transmission, Cylindrical bodies, Propagation, Programming, Computers.

The discovery of complex modes of propagation and the availability of high-speed computers served to revive an interest in the problem of wave propagation in isotropic elastic cylinders. The complex modes ended the search for a complete set of stress functions which are necessary to describe an arbitrary body force. The high-speed computer provides the means for investigation of a problem which is otherwise too complicated to analyze precisely. (Author)

AD-277 610 Div. 25
(TISTP/WH) OTS price $1.10

Hebrew U. (Israel).
A STUDY OF THE INTERNAL FIELDS ACTING ON NUCLEI IN SOLIDS USING THE TECHNIQUES OF THE MOSSBAUER ABSORPTION AND PERTURBATION OF GAMMA-GAMMA CASCADES.
Annual summary rept., 1 Jan 60-31 Dec 61, by S. G. Cohen. 22 Jan 62, 8p.
(Contract AF 61(052)347)
(AFOSR 2929) Unclassified report

DESCRIPTORS: *Nuclear forces, *Nuclei, *Nuclear resonance, *Nuclear fluorescent scattering. Garnet, Iron.

A study is presented of the internal fields acting on nuclei in solids using the techniques of the Mossbauer absorption and perturbation of gamma-gamma cascades. (Author)

AD-277 626 Div. 25
(TISTP/FR) OTS price $3.60

Oxford U. (Gt. Brit.).
GENERATION AND USE OF PULSED MAGNETIC FIELDS,
by Colin S. Gaskell. 1962, 21p. illus. 28 refs.
(Technical note no. 11)
(Contract AF 61(514)1183)
(AFOSR-2931) Unclassified report

DESCRIPTORS: *Magnetic fields, *Gadolinium. Magnet coils, Capacitors, Switches, Rare earth elements, Metals, Magnetic properties.

Methods of generating high magnetic fields are surveyed, and the design and construction of a pulsed field set are described. Capacitors are used to store the energy, and are discharged through a triggered spark gap into a special wire-wound solenoid. By this method, fields up to 280 kilogauss have been produced. A method of plotting magnetisation curves in high fields is described, and results are given for gadolinium. Sources of error and possible improvements in the experimental technique are discussed. (Author)

AD-277 631 Div. 25
(TISTP/FR) OTS price $11.00

National Magnet Lab., Mass. Inst. of Tech., Cambridge.
FORCED-CONVECTION SURFACE BOILING HEAT TRANSFER AND BURNOUT IN TUBES OF SMALL DIAMETER,
by Arthur E. Bergles and Warren M. Rohsenow.
25 May 62, 140p. incl. illus. tables, 80 refs.
(Technical rept. no. 8767-21)
(Contract AF 19(604)7344)
Unclassified report

DESCRIPTORS: *Heat transfer, *Boiling, Pipes, Convection, Instrumentation, Experimental data.

A basic heat-transfer apparatus was designed and constructed for the study of forced-convection boiling in small channels. The various regions of forced-convection surface boiling were studied experimentally and analytically. In the region of low wall superheat, the heat flux can be predicted by available correlations for forced convection. Data indicate, however, that these correlations do not properly account for the radial variation of properties for water at high temperature difference. The conventional Dittus and Boelter-McAdams relationship is recommended for design purposes on the basis of its simplicity and conservative predictions. (Author)

AD-277 637 Div. 25
(TISTP/WH) OTS price $1.10

Stanford U., Calif.
THE SYMMETRIZED MANY-CHANNEL ND(-1) METHOD AND THE POLE APPROXIMATION,
by Arthur W. Martin. June 62, 7p. (Technical note no. 59)
(Contract AF 49(638)388)
(AFOSR-2566) Unclassified report

DESCRIPTORS: *Scattering, *Nuclear physics.

The many-channel ND(-1) technique in dispersion relations proposed by Bjorken has been reformulated in a way which automatically insures the symmetry of the scattering matrix. The usefulness of this new representation is discussed and it is shown that the representation allows the solution to the many pole approximation problem to be written down by inspection. Possible applications of this solution to physical problems are indicated. (Author)

AD-277 641 Div. 25, 26
(TISTP/WH) OTS price $1.60

Texas Instruments, Inc., Dallas.
RESEARCH AND DEVELOPMENT OF YTTRIUM IRON GARNET SINGLE CRYSTALS.
Interim engineering rept. no. 2, 1 Jan-31 Mar 62. 30 May 62, 9p. incl. illus. 14 refs.
(Contract NObsr-87241)
Unclassified report

DESCRIPTORS: *Ferromagnetic materials, *Garnet, *Single crystals. Iron compounds, Zone melting, Dielectric properties, Magnetic properties, Yttrium compounds, Oxides, Growth.

Yttrium iron garnet (YIG) single crystals 1/4 to 3/8 in. diameter with a dielectric constant of about 10 and 0.002 dissipation factor were produced by the floating zone technique. Ferrimagnetic resonance line-widths of less than 2 oersteds were obtained from polished test spheres. Crack formation remains a major problem in growing YIG crystals by the floating zone technique. The occasional appearance of a mixture of YIG and iron oxide crystals as a second phase inclusion in YIG was related to zone temperature fluctuations. It is postulated that this second phase formation can be prevented by better temperature control and decreased zoning rate (0.10 in./hr.). Increasing the availability of active oxygen is discussed as a possible method of decreasing the divalent iron concentration in YIG. This action would favorably influence line-width. (Author)

rier analysis of optical systems is used to establish close analogies between linear electrical filters and optical systems. There are practical applications such as the precise description of optical system quality, the evaluation of system performance, and spatial filtering in electro-optical search and track devices. (Author)

AD-277 560 Div. 25
(TISTP/WH) OTS price $4.60

Kansas U., Lawrence.
NUCLEAR ALIGNMENT OF CERIUM-141 IN CERIUM MAGNESIUM NITRATE,
by R. C. Sapp and W. W. Strohm, Jr. 1 July 62, 29p. illus. 29 refs. (Technical rept. no. 3)
(Contract Nonr-277500, Proj. NR 018-202)
Unclassified report

DESCRIPTORS: *Paramagnetic salts, *Nuclear spins, *Nuclear magnetic moments. Cerium, Radioactive isotopes, Cryogenics, Magnetic properties, Nuclear reactions, Gamma rays, Ethylenes, Sulfides.

Nuclear alignment of Ce-141 was produced by adiabatic demagnetization to very low temperatures of cerium magnesium nitrate, to detect the presence of attenuation due to intermediate state perturbation. At 1/theta = 150 the radiation pattern, corrected for counter geometry, is W(lambda sub 2) = 1 + 0.174 B2 P2 (cos lambda sub 2). The degree of linear polarization at the same temperature is P = + 0.300 + 0.033. From these data we obtain the E2/M1 mixing ratio delta = + 0.075 ± 0.013 and the over-all attenuation coefficient due to spin-spin interaction and to intermediate state perturbation lambda sub 2 Q2 = + 0.97 ± 0.08 at this temperature.. Thus attenuation is very much smaller than previously believed. The results are in good agreement with corresponding values for Ce-141 in the ethylsulfate. At the lowest temperatures the radiation pattern departs strongly from simple behavior, probably due to the onset of a magnetically ordered state. (Author)

AD-277 562 Div. 25, 9
(TISTP/JW) OTS price $5.60

Thayer School of Engineering, Dartmouth Coll., Hanover, N. H.
ON ANODE GAS-SHEATH ELECTRICAL BREAKDOWN IN A HIGH-PRESSURE-ARC PLASMA GENERATOR,
by John R. Wheaton and Robert C. Dean, Jr.
Oct 61, 52p. incl. illus. table, 2 refs.
(Contract AF 33(657)8179)
Unclassified report

DESCRIPTORS: *Electrical conductance, *Plasma physics, *Electric arcs. Fluid flow, Boundary layer, Anodes, Cathodes, Voltage, Stability.

An experimental investigation into the mechanisms of electrical conduction across the low temperature gas layer covering the cooled anode of a high-pressure nitrogen arc plasma generator is reported. Various flow regimes are identified; the turbulent mode is studied particularly. The cool wall gas sheath is shown to be bridged electrically by a moving concentrated arc. This arc behavior leads to a cyclic variation of the potential difference between cathode and anode, but the arc current remains constant. Re-ignition of the arc after each cycle of travel down the nozzle-anode occurs by breakdown of the electrode gap in the neighborhood of the cathode. This breakdown occurs at abnormally low voltage differences; the evidence indicates that the breakdown is strongly affected by the aerodynamic characteristics of the flow around the cathode. Reduced data for arc velocity, cycle time, voltage fluctuations, and time-average arc characteristics are presented for Nitrogen. (Author)

AD-277 601 Div. 25
(TISTP/JW) OTS price $8.10

Battelle Institut, Frankfurt/Main (Germany).
THEORETICAL INVESTIGATIONS AND DESIGN STUDIES FOR THE EVENTUAL CONSTRUCTION OF A MEASURING DEVICE IN THE FIELD OF PLASMA ELECTRONICS. PART III. CALCULATION OF THE DEFLECTION OF A PLANE ELECTROMAGNETIC WAVE PENETRATING A CYLINDRICAL PLASMA COLUMN.
Final rept., 1 May 61-28 Feb 62.
15 June 62, 53p. incl. illus. 10 refs.
(Contract DA 91-591-EUC-1018)
Unclassified report

DESCRIPTORS: *Plasma physics, *Electromagnetic waves, *Ionosphere, *Satellite vehicles. Magnetohydrodynamics, Physical properties, Interferometers, Refraction, Electron mass.

This study concerns the deflection of a bundle of parallel rays penetrating a cylindrical plasma column with parabolic electron density distribution. The phase transit time of a ray in the plasma column can be determined under special assumptions. The following cases are studied: At first it is assumed that rays penetrate the plasma near the symmetry axis of the arrangement and that, owing to small electron density, these rays are only slightly deflected. The phase transit time of rays penetrating the plasma undeflected was determined; in this case the amount of calculations required is substantially smaller than in the first case. The accuracy of this result can be improved by assuming V-shaped rays instead of direct rays. Finally, an even more exact result can be obtained by consideration of the local dependence of the refraction index in the plasma cylinder. The functions resulting from the numerical calculations are shown graphically. (Author)

AD-277 603 Div. 25
(TISTP/WH) OTS price $7.60

Institute of Engineering Research, U. of Calif., Berkeley.
SHOCK WAVE STRUCTURE IN PARTIALLY IONIZED GASES. Doctoral thesis,
by Maheshinder Singh Grewal. 21 May 62, 67p. incl. illus. 16 refs. (Rept. no. HE-150-198; Series no. 132, Issue no. 5)
(Contract AF 49(638)502)
Unclassified report

DESCRIPTORS: *Shock waves, *Gas ionization, *Plasma physics. Argon, Electrons, Hypersonics, Transport properties, Electric fields, Kinetic theory.

The structure of a shock wave in a partially ionized gas, which is in thermal non-equilibrium ahead of the shock wave, is investigated. A method is developed to solve this problem by separating it into two parts. First the structure of the shock wave associated with the mixture of ions and atoms, which are assumed to behave alike through the shock transition, is taken to be of the Mott-Smith form. Then the behavior of electrons as they pass through this ion-atom shock is analyzed. Using this method, calculations are made for the shock wave structure in partially ionized argon for Mach numbers equal to 8, 10 and 12, and for the values of the electron-ion temperature ratio ahead of the shock wave equal to 3, 5 and 8. (Author)

AD-277 604 Div. 25, 30
(TISTP/GRW) OTS price $13.00

California U., Los Angeles.
AN EXPERIMENTAL AND THEORETICAL INVESTIGATION

AD-277 728 Div. 25
(TISTP/WH) OTS price $4.60

Motorola, Inc., Phoenix, Ariz.
STUDY OF FAILURE MECHANISMS AT SURFACES AND INTERFACES,
by Kenneth Greenough. 27 Apr 62, 41p. incl. illus. tables, 17 refs. (Rept. no. 2710)
(Contract AF 30(602)2593, Proj. 5519)
(RADC TDR 62-266) Unclassified report

DESCRIPTORS: *Failure (Mechanics), *Solid state physics, Thin films, Molectronics, Semiconductors, Electrodes, Glass, Dielectrics.

The investigation of the primary modes of failure in solid state devices and components is directed toward the study of chemical and physical phenomena occurring at the interfaces formed by two dissimilar materials in intimate molecular contact. The experimental approach is based on the concept of building and evaluating thin-film model systems representing two basic material interfaces found in solid state device technology: interface between an electrode and thin film glass dielectric, and interface between a solid state semiconductor resistance element and its substrate. (Author)

AD-277 734 Div. 25
(TISTP/WH) OTS price $3.60

Washington Square Coll., New York U., N. Y.
RESEARCH ON SOLID STATE RADIATION-INDUCED PHENOMENA,
Quarterly progress rept. no. 9, Feb-Apr 62,
by Hartmut P. Kallmann. May 62, 36p. incl. illus.
(Contract DA 36-039-sc-85126)
Unclassified report

DESCRIPTORS: *Solid state physics, *Semiconductors, *Conductivity, *Liquefied gases, *Luminescence, Benzenes. High temperature research, Impurities, Cadmium compounds, Sulfides, Single crystals, Zinc, Brillouin zones, Nitrogen, Fluorescence, Photoconductivity.

Self-activated semiconductivity in CdS single crystals: The semiconductivity produced by self-activation in cadmium sulfide zinc crystals is investigated. It can be ascribed to the formation of Frenkel and Schottky defects. Non-electrical method for keeping the level of liquid nitrogen in a dewar vessel constant: A cooling technique is described which provides for keeping the temperature of a cooled sample constant within 1/10 degree. The sample is dipped into a dewar vessel which has a pipe coming out at the level where the liquid nitrogen should be maintained. Closing the dewar top provides automatic self-control of the liquid level when liquid nitrogen is pumped into the vessel via a syphon pipe. Simultaneous conductivity and luminescence measurements on ZnS (Cu) powder: A.C. Impedance measurements were used to determine the photoconductivity of a ZnS:Cu phosphor. To obtain homogeneous excitation, long wavelength irradiation (blue and green light) was used. Even with this type of excitation (activator absorption only) some inhomogeneity exists. Temperature effects: The gamma-ray induced fluorescence of a series of deoxygenated solution of p-terphenyl in o-xylene is measured as a function of increasing temperature. Quenching is greatest in the absence of solute. Dilution of the solvent by a non-transferring liquid does not affect the degree of quenching.

AD-277 741 Div. 25
(TISTP/WH) OTS price $2.60

Queen's U., Belfast (Gt. Brit.).
AN EXPANSION METHOD FOR CALCULATING ATOMIC PROPERTIES II,
by M. Cohen, A. Dalgarno, and J. M. McNamee.
1962, 25p. 9 refs.
(Contract AF 61(052)131)
(AFCRL 62-646) Unclassified report

DESCRIPTORS: *Helium, *Beryllium, *Nuclear energy, *Quantum mechanics, *Series. Atomic structure.

The accuracy of the methods of calculating the expectation values of perturbed atomic systems is analyzed by means of an expansion in inverse powers of the nuclear charge. Results are presented for the quadrupole polarizabilities and nuclear shielding factors of all members of the helium and beryllium isoelectronic sequences and it is shown that the loss of accuracy entailed in replacing the full self-consistent method by a simpler one is small. (Author)

AD-277 742 Div. 25
(TISTP/WH) OTS price $1.10

Queen's U., Belfast (Gt. Brit.).
THE CORRELATION ENERGIES OF THE HELIUM SEQUENCE,
by W. B. Somerville and A. L. Stewart. 1962,
8p. table, 11 refs.
(Contract AF 61(052)131)
(AFCRL 62-647) Unclassified report

DESCRIPTORS: *Helium, *Quantum mechanics, *Nuclear energy, *Series.

An attempt is made to determine with high accuracy the effect of configuration interaction in the second order term in the expansion of the energy of the ground state of the two electron systems in inverse powers of the nuclear charge. The equations for the separate angular harmonics of the first order wave function are solved variationally using expansions in terms of one electron orbitals, with the object of examining the rate of convergence as the number of orbitals in the trial solution is increased. The convergence of the harmonic expansion is found to be slow, the contributions falling off as 0.35 lambda to the -4 power. The radial expansion is also slowly convergent particularly in the case of the high order harmonic contributions, lambda equals or exceeds 5. (Author)

AD-277 743 Div. 25
(TISTP/WH) OTS price $2.60

Queen's U., Belfast (Gt. Brit.).
THE ROTATIONAL EXCITATION OF MOLECULAR NITROGEN BY SLOW ELECTRONS,
by A. Dalgarno and R. J. Moffett. 1962, 17p.
illus. table, 12 refs.
(Contract AF 61(052)131)
(AFCRL 62-648) Unclassified report

DESCRIPTORS: *Molecular rotation, *Nitrogen. Excitation, Electrons, Radio waves, Molecules, Partial differential equations.

A quantal calculation is carried out of the energy loss parameter which occurs in theories of radio wave interaction in the atmosphere and its accuracy is discussed. The limits of validity of the conventional formulation of radio wave interaction are briefly examined. (Author)

AD-277 756 Div. 25
(TISTP/JW) OTS price $1.00

Texas Nuclear Corp., Austin.
NEUTRON-GAMMA RAY SPECTROMETER.
Final rept., 1 Jan-15 Dec 61 on The Chemistry and Physics of Materials,
by J. D. Hall and J. B. Ashe. Apr 62, 25p.

Division 25 - PHYSICS

AD-277 648 Div. 25, 4
(TISTM/EJH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HIGHLY REFRACTORY SYSTEMS WITH LANTHANIDE AND ACTINIDE OXIDES,
by S. G. Tresvyatskiy and A. M. Cherepanov. 15 May 62, 15p. incl. illus. 30 refs. (Trans. no. FTD-TT-62-505 of Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva 6:612-618, 1961)
Unclassified report

DESCRIPTORS: *Refractory materials - Phase transitions, *Rare earth compounds, *Oxides - Phase transitions, *Phase studies. Transition temperature, Ceramic materials, Eutectics, Melting, Actinium series, Uranium compounds, Aluminum compounds, Beryllium compounds, Magnesium compounds, Zirconium compounds, Calcium compounds, Silicon compounds, Thorium compounds.

A discussion of phase diagrams of highly refractory oxides with oxides of lanthanides and actinides, as found in the literature, is presented. Included are certain generalizations concerning tetravalent actinide oxide systems containing one of the following: beryllium oxide, magnesium oxide, calcium oxide, aluminum oxide, zirconium oxide, silica, oxides of trivalent rare earth elements. Generalizations concerning oxides of trivalent rare earth elements are included. Systems with beryllium oxide are eutectic and analogous to systems with actinides. Also discussed are trivalent rare earth systems with aluminum oxides, ZrO2, SiO2.

AD-277 698 Div. 25
(TISTA/WAW) OTS price $3.60

Aerospace Corp., El Segundo, Calif.
SYMMETRIC PLANAR VIBRATIONS OF A ROTATING DISK,
by Pravin G. Bhuta and John P. Jones. 30 Apr 62, 33p. incl. illus. tables, 11 refs. (Rept. no. TDR-930(2230-09)TN-5)
(Contract AF 04(647)930)
(DCAS TDR 62-97) Unclassified report

DESCRIPTORS: *Disks - Vibration. Stability, Resonance, Mathematical analysis, Differential equations, Rotating structures.

The complete problem of coupled symmetric radial and torsional vibrations of a thin rotating circular disk has been solved using undeformed coordinates. The formulation of the problem used yields several interesting and previously unreported results for the static problem. Two types of instabilities occur, static resonances and classical instabilities, for which radial and torsional displacements everywhere in the disk can become unboundedly large. These resonances were explained physically. The solutions of the frequency equation and the mode shapes are obtained. The effect of rotation is to lower the natural frequencies of the disk. When deformed coordinates are used, as is the case in the classical analysis of a rotating disk, the instabilities are concealed and are not nearly as obvious. (Author)

AD-277 699 Div. 25, 8
(TISTP/JW) OTS price $8.10

American Machine and Foundry Co., Alexandria, Va.
SOLID STATE MATRIX.
Quarterly rept. no. 1, 1 Apr-30 June 62, by R. N. Stock. 15 July 62, 80p. incl. illus. tables.
(Contract AF 33(657)8688)
Unclassified report

DESCRIPTORS: *Electric power production, *Solid state physics. Transmission lines, Circuits, Design, Semiconductors, Control systems, Reliability.

The basic purpose is to develop an efficient and practical solid state transmission link (electrical power control system) that will have positive advantages over the conventional electromechanical transmission links used in present-day aircraft. Primary emphasis is on reliability and long life. This report presents: (1) the analysis of the systems which will be made solid state; (2) the abstract logic for the solid state systems; (3) the evaluation of semiconductor devices for the solid state systems; and (4) the preliminary circuit design considerations. (Author)

AD-277 710 Div. 25
(TISTP/WH) OTS price $2.60

Cornell U., Ithaca, N. Y.
THE MOTION OF A NON-CONDUCTING SPHERE THROUGH A CONDUCTING FLUID IN A MAGNETIC CROSS-FIELD,
by G. S. S. Ludford and M. P. Singh. June 62, 20p. incl. illus. 8 refs. (Technical rept. no. 1)
(Contract Nonr-40146 and Grant G-19911)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Fluid mechanics. Spheres, Motion, Fluids, Magnetic fields.

The slow uniform motion of a sphere through an incompressible, inviscid, electrically conducting fluid in the presence of a transverse magnetic field is investigated. It is assumed that the sphere is a perfect insulator of the same magnetic permeability as the fluid. (Author)

AD-277 712 Div. 25
(TISTP/TL) OTS price $4.60

Cornell U. Graduate School of Aeronautical Engineering, Ithaca, N. Y.
AN EXPERIMENTAL STUDY OF THE SURFACE WAVES GENERATED BY A TIME VARYING MAGNETIC FIELD. Master's thesis,
by Glenn C. Light. Feb 62, 27p. illus. 8 refs.
(Contract AF 49(638)544)
(AFOSR-2956) Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Gases, *Fluid flow, *Compressible flow, *Plasma physics, *Mercury, *Electromagnetic waves - Tests, *Magnetic fields. Magnetic pinch, Deflection, Electric discharges, Fluid mechanics, Coaxial cables, Light, Photoelectric cells, Oscilloscopes, Camera.

Surface waves have been generated on a circular pool of mercury by means of induced currents. A discharge through a pair of coaxial coils generates induced currents in the mercury; these currents in turn interact with the currents in the coils to produce a force. The geometry constitutes the free-surface analogy of the circular pinch. The height of the free surface is analogous to the density in an infinite column of compressible gas. In the experiments reported here only weak disturbances are considered. A theoretical relation for the height of the disturbances is derived from the analogous gas-dynamic problem. The theory is in good agreement with the measured values of the disturbance height. The success of these initial experiments indicates the possibility of obtaining useful information on the containment problem by exploitation of the free-surface analogy. (Author)

tion coefficient is then found as a function of the measured ion and neutral densities by equating the rates of ion generation and ion loss. (Author)

AD-277 926 Div. 25
(TISTP/WH) OTS price $9.60

McGill U. (Canada).
KINETICS AND MASS SPECTROMETRY OF ATMOSPHERIC ATOMS AND MOLECULES.
Final rept., 1 Sep 58-30 Sep 61,
by H. I. Schiff. May 62, 107p. incl. illus. tables.
(Contract AF 19(604)4104, Proj. 7635)
(AFCRL 62-481) Unclassified report

DESCRIPTORS: *Upper atmosphere, *Gas ionization, *Recombination reactions, *Oxygen. Molecular association, Ozone, Mass spectrometers, Kinetic theory.

Contents:
Electron impact study of nitric oxide using a modified retarding potential difference method
The reaction of oxygen atoms with carbon tetrachloride
Electrically discharged CO2 as a source of oxygen atoms
Recombination of oxygen atoms in the absence of O2
Absolute rate constant for light emission of the air afterglow reaction for the wavelength region 3875-6200 Angstroms
Mass spectrometric studies of atom reactions; Reactions in the atomic nitrogen-ozone system

AD-277 930 Div. 25, 15
(TISTP/JW) OTS price $2.60

Naval Research Lab., Washington, D. C.
A GRAPHICAL-NUMERICAL METHOD FOR THE TRANSIENT RESPONSE OF NONLINEAR SYSTEMS.
Interim rept.,
by P. F. Cunniff. 13 June 62, 24p. incl. illus. 6 refs. (NRL rept. no. 5785)
Unclassified report

DESCRIPTORS: *Nonlinear systems, *Load distribution. Transients, Stresses, Analog computer, Structural shells, Dynamics.

A graphical-numerical method is developed for determining the response of nonlinear systems subjected to transient loads. The method consists of constructing phase-plane trajectories in conjunction with simple computations. The numerical equivalent procedure of the graphical-numerical method is derived and a scaling law is presented for nonlinear multi-degree-of-freedom systems. Example problems are solved by the graphical-numerical method and the solutions compared with those of an analog computer at NRL. The solution of an example problem by both the graphical-numerical method and the numerical equivalent method indicates that the drawing error due to the graphical construction technique is negligible. (Author)

AD-277 938 Div. 25, 9
(TISTP/JW) OTS price $8.10

RCA Defense Electronic Products, Camden, N. J.
MAGNETIC THIN FILM MEMORY (FLUX LOGIC PERMALLOY SHEET MEMORY).
Quarterly progress rept. no. 3, 1 Jan-31 Mar 62,
by G. R. Briggs and R. D. Torrey. 31 Mar 62, 89p. incl. illus. tables.
(Contract DA 36-039-sc-88971)
Unclassified report

DESCRIPTORS: *Memory devices, *Digital computers, *Microminiaturization (Electronics). Switching circuits, Printed circuits, Electronic circuits, Magnetic cores, Sheets, Sensitivity.

Several transistor core driver designs are presented and explained. Their chief characteristics are simplicity and flexibility. These circuits were incorporated into simulated system configurations to observe their performance characteristics. General operational results proved satisfactory; however, these circuits have not been finalized. A modification of the memory test system logic is explained. This modification is made in the interest of increased system flexibility. (Author)

AD-277 939 Div. 25
(TISTP/JW) OTS price $3.60

Republic Aviation Corp., Farmingdale, N. Y.
MAGNETIC INDUCTION GYROSCOPE RESEARCH AND DEVELOPMENT.
Quarterly progress rept. no. 1, 1 Mar-31 May 62, 20 June 62, 31p. incl. illus. (Rept. no. RAC 815)
(Contract NOw 62-0660-d)
Unclassified report

DESCRIPTORS: *Gyroscopes, *Magnetic fields, *Induction systems. Magnetic guidance, Rotation, Voltage, Velocity.

Research has been carried out on a magnetic induction gyroscope which falls into a class often called nuclear gyroscopes. The magnetic induction gyroscope employs a set of magnetic fields of specified relative orientation, strength, and frequency applied to a sample of paramagnetic material. Theoretical studies performed in this area reveal that such a system is sensitive to the common rotation of the sample and the field generating structure, and that voltages proportional to the rotational velocity may be induced in a suitably located coil. This device offers the possibility of developing gyroscopic behavior with little mechanical complexity and with very low drift rates. Experiments utilizing simulated rotation have verified theoretical predictions. Further investigation is in the progress, and the establishment of an actual rotating model of the gyroscope is presently in the design stage. (Author)

26. PRODUCTION AND MANAGEMENT

AD-277 660 Div. 26, 17
(TISTM/BRW) OTS price $3.60

Aeroprojects, Inc., West Chester, Pa.
DEVELOPMENT OF ULTRASONIC WELDING EQUIPMENT FOR REFRACTORY METALS.
Interim technical progress rept., 1 Feb-30 Apr 62,
by Nicholas Maropis. May 62, 32p. incl. illus. tables, 38 refs.
(Contract AF 33(600)43026)
(ASD TR 7-888, Vol. 3) Unclassified report

DESCRIPTORS: *Welding - Ultrasonics, *Industrial equipment. Design, Transducers, Energy, Power supplies, Heat resistant alloys, Refractory materials, Nickel alloys, Niobium alloys, Molybdenum alloys, Titanium alloys, Tungsten, Chromium alloys, Cobalt alloys, Stainless steel, Sheets, Alloys, Metals.

The requirements for a heavy-duty ultrasonic welding system are being analyzed, and associated development problems resolved. High-power ceramic transducer assemblies, power-force program-

incl. illus. tables, 11 refs.
(Contract AF 33(616)7787, Proj. 7360)
(ASD TDR 62-52)
Unclassified report

DESCRIPTORS: *Gamma ray spectrometers, *Neutron spectrometers. Neutrons, Gamma rays, Scintillation counters, Detection, Pulse discriminators.

A neutron-gamma ray spectrometer is described. The spectrometer employs pulse shape discrimination in an organic scintillator detector to selectively detect neutrons or gamma rays in a mixed field by a method not utilizing space charge limiting. Selective detection may be obtained for neutrons of energy higher than 0.7 Mev and for gamma rays above 0.25 Mev. Spectral information is useable to 15 Mev for neutrons and to 4 Mev for gamma rays. Detection efficiencies range from about 6% to 30%. Typical spectra, data analysis procedure, and operating characteristics of the spectrometer are presented. (Author)

AD-277 793 Div. 25, 4, 30
(TISTM/EJH) OTS price $1.50

Polacoat, Inc., Blue Ash, Ohio.
INVESTIGATION OF INORGANIC PHOTOTROPIC MATERIALS AS A BI-OPTIC ELEMENT APPLICABLE IN HIGH DENSITY STORAGE COMPUTER MEMORIES.
Rept. for 1 June 60-31 Dec 61.
Apr 62, 50p. incl. illus. tables, 8 refs.
(Contract AF 33(616)7333, Proj. 7062)
(ASD TDR 62-305) Unclassified report

DESCRIPTORS: *Photochemistry, *Optical materials, *Ultraviolet optical materials, *Memory devices. Optical systems, Data storage systems, Inorganic substances, Lattices, Color centers, Ultraviolet radiation, Aluminum compounds, Sodium compounds, Silicates, Synthesis, Optics, Theory, Light transmission.

A general evaluation of the various types of phototropic (i.e., reversible, light induced, color producing) phenomenon is given regarding the application of phototropic materials to bi-optic high density storage media for computer memories. The inorganic ''F'' center type phototropic systems were chosen as the area offering the greatest potential. The results of a detailed evaluation and synthesis program in this area substantiating this potential application is given. (Author)

AD-277 796 Div. 25, 14
(TISTM/TCG) OTS price $.50

Brussels U. (Belgium).
VAPORIZATION OF COMPOUNDS AND ALLOYS AT HIGH TEMPERATURES. PART VIII. MASS SPECTROMETRIC STUDY OF GASEOUS SPECIES IN THE SYSTEM BORON-CARBON.
Rept. for Mar 61-Mar 62 on Refractory Inorganic Non-Metallic Materials,
by G. Verhaegen, F. E. Stafford and others.
Apr 62, 5p. incl. 16 refs.
(Contract AF 61(052)225, Proj. 7350)
(WADD TR 60-782, pt. 8) Unclassified report

DESCRIPTORS: *Refractory materials - Spectrographic analysis, *Boron compounds - Thermodynamics, *Carbides. Vaporization, Gases, Vapors, Molecules, Enthalpy, Atomization, Energy, Thermochemistry, High temperature research, Silicides, Mass spectrometers.

The molecules BC, B2C and BC2 were identified by mass spectrometric analysis. Their measured atomization energies are as follows: BC, 105 ± 10; B2C, 260 ± 10; and BC2, 302 ± 10 kcal/mole.

AD-277 905 Div. 25
(TISTM/REB) OTS price $1.60

RIAS, Inc., Baltimore, Md.
THE RELATIONSHIP BETWEEN POINT AND LINE DEFECTS PRODUCED DURING PLASTIC DEFORMATION OF COPPER,
by Howard R. Peiffer. July 62, 9p. illus.
10 refs. (Technical rept. no. 2)
(Contract Nonr-370700)
Unclassified report

DESCRIPTORS: *Copper, *Plastic flow. Deformation, Resistance.

It is shown that for cold-worked copper the resistivity increase associated with point defects is proportional to the resistivity increment associated with line defects. These experiments verify the uncertainty principle of dislocation axes as applied to point defect formation. (Author)

AD-277 907 Div. 25
(TISTP/WH) OTS price $2.60

Guggenheim Jet Propulsion Center, Calif. Inst. of Tech., Pasadena.
SPECTROSCOPIC TEMPERATURE MEASUREMENTS ON THE OH 2 SIGMA-2 PI BAND SYSTEM FOR A TRANSPARENT GAS IN A SHOCK TUBE,
by R. Watson. June 62, 22p. incl. illus.
11 refs. (Technical rept. no. 39)
(Contract Nonr-22045, Proj. NR 015 401)
Unclassified report

DESCRIPTORS: *Molecular spectroscopy, *Molecular rotation, *Gases. Electron transitions, Hydroxides, Temperature, Measurement, Shock tubes, Heat, Monochromatic light.

Calculations pertaining to the measurement of the equilibrium gas temperature in a shock tube are presented. The calculations are based on the method of monitoring simultaneously the relative light emission fron two wavelength regions of the vibration-rotation bands belonging to the 2 sigma to 2 pi electronic transition of the OH radical. The apparatus required for the temperature measurements is described and an appropriate calibration procedure for the instrumentation is indicated. (Author)

AD-277 917 Div. 25
(TISTP/WH) OTS price $3.60

Hughes Research Labs., Malibu, Calif.
CESIUM PLASMA STUDIES FOR THERMIONIC ENERGY CONVERSION.
Final rept.,
by R. C. Knechtli and J. Y. Wada. June 62, 30p.
incl. illus. table, 5 refs.
(Contract Nonr-350100)
Unclassified report

DESCRIPTORS: *Plasma physics, *Thermionic emission, *Recombination reactions, *Cesium. Magnetic pinch, Gas ionization, Power supplies, Work functions.

A new method for measuring the volume recombination coefficient, α, of thermal cesium plasmas in steady state has been devised and perfected. In this method, a thermal cesium plasma column is magnetically confined between two plasma generators. The plasma is generated by contact ionization and thermionic emission. The rate of plasma generation is controlled by the cesium vapor pressure in the device, the latter being directly measured in absolute value. The rate of plasma loss (in the range of measurement of α) is predominantly controlled by volume recombination, i.e., by α and by the plasma density. The latter is measured by Langmuir probes. The recombina-

tions for crack propagation. The scale model motor, its process tooling, and test stand were designed. Results to date of the survey of various nondestructive testing techniques are summarized; the survey is being continued. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-277 568 Div. 28
(TISTB/AW) OTS price $8.60

National Training Labs., Washington, D. C.
SELECTION OF FEED-BACK INFORMATION AS A FUNCTION OF SITUATIONAL STRESS, NEED FOR ACHIEVEMENT, AND INTERPERSONAL AWARENESS.
Technical rept. no. 14 on Factors Determining Defensive Behavior Within Groups,
by Jacob Schonfield. Aug 61, 43p. incl. tables. (Contract Nonr-3088(00); In cooperation with Colorado U., Boulder, Contract Nonr-114703, and Delaware U., Newark, Contract Nonr-228501)
Unclassified report

DESCRIPTORS: *Psychology, *Stress (Psychology), *Group dynamics, *Personality, Learning, Psychometrics, Sociometrics, Anxiety, Attitudes, Personality tests, Achievement tests.

Six students of the same sex met as a group and were given a human relations problem to solve. An absolute drop in requests for information by persons informed that the problem was an easy one was recorded. This phenomenon was explained as being due to the operation of ego-defense mechanisms working to reduce input of ego-threatening information. Persons low in achievement needs indicated more interest in task-relevant information on the free-choice questionnaire than did persons with high achievement scores. Over-achievers asked for more task-relevant information than did under-achievers. An attempt was made to explain the incongruous nature of these findings, and recommendations were made on the use of fantasy to measure achievement and affiliation needs. The relationship between a person's awareness of the feelings of others toward him and his desire for knowledge about such feelings was also studied. (Author)

AD-277 617 Div. 28, 23
(TISTB/AW) OTS price $5.60

Aviation Psychology Lab., Ohio State U. Research Foundation, Columbus.
WHOLE VERSUS PART TRAINING AS A FUNCTION OF TASK DIMENSIONS.
by George E. Briggs, James C. Naylor, and Alfred H. Fuchs. 18 Feb 62, 52p. incl. illus. tables, 7 refs.
(Contract N61339-950)
(NAVTRADEVCEN 950-2) Unclassified report

DESCRIPTORS: *Training, Design, Effectiveness, Learning, Military psychology, Transfer of training, Tracking, Aviation personnel.

Three experiments were performed to investigate pure-part, progressive-part, simplified, and whole training techniques as a function of several task parameters. Experiment I compared all four methods as a function of the complexity of a three-dimensional tracking task. The whole method was superior, but the relative efficiency of the progressive-part method increased as task complexity increased. Experiment II compared progressive-part, simplified, and whole training as a function of the complexity of a discrete control task. Again, the whole method was superior, but both simplified and progressive practice increased in relative efficiency as complexity was raised. The final experiment investigated progressive-part and whole practice as a function of both task complexity and task organization. For tasks of high complexity the progressive-part method was superior under conditions of low organization and the whole method superior under conditions of high organization. With tasks of low complexity, whole methods were somewhat superior under conditions of high or low organization. (Author)

AD-277 683 Div. 28
(TISTB/MS) OTS price $2.60

System Development Corp., Santa Monica, Calif.
PERSONALITY FACTOR STABILITY FOR THREE ABILITY LEVELS,
by Miles S. Rogers and Gerald H. Shure.
18 June 62, 24p. incl. tables, 19 refs. (Rept. no. SP-652/000/01)
Unclassified report

DESCRIPTORS: *Personality tests, *Factor analysis. Statistical analysis.

AD-277 815 Div. 28
(TISTB/MS) OTS price $.75

Behavioral Sciences Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
REMOTE-HANDLING TASK PERFORMANCE AS A FUNCTION OF INDEXING VARIABLES.
Final rept. for Nov 60-Jan 61 on Human Factors in Advanced Flight,
by D. F. Baker. Dec 61, 23p. incl. illus. tables, 13 refs.
(Proj. 7184)
(ASD TR 61-626) Unclassified report

DESCRIPTORS: *Remote control systems - Tests, *Psychomotor tests, *Positioning reactions, Control systems, Applied psychology, Human engineering, Indexes.

Three variables in remote-handling operations were studied: mode of indexing actuation, rate of angular indexing, and task distance. A CRL Model 8 Master Slave Manipulator was used by subjects performing a positioning task which required angular indexing (mechanical motion was locked in the Y axis). Actuation of indexing was either by a finger trigger or a foot pedal, and at one of three different indexing speeds. The task involved positioning objects at one of two distances from the operator. In terms of speed of performance, the foot-pedal and finger-trigger controls were equal. However, rate of learning and accuracy of performance were greater with foot-pedal actuation. Task efficiency, measured in speed of performance, increased directly with indexing speed at the far-task distance. This effect was not noted at the near distance. (Author)

AD-277 915 Div. 28
(TISTB/AW) OTS price $1.60

Human Engineering Lab., Aberdeen Proving Ground, Md.
AN INVESTIGATION COMPARING THE RELATIVE EFFECTS OF TWO MODES OF GUN TURRET OPERATION ON TRACKING PERFORMANCE: STUDY I,
by Harold C. Wallach and Hugo L. Klein. Apr 62, 13p. incl. illus. tables, 6 refs. (Technical memo. no. 4-62)
Unclassified report

ming elements, and switching devices for a motor-alternator power source are being assembled and experimentally evaluated. Current information on refractory metal developments affecting the ultrasonic weldability of such material, as well as data on candidate welding tip materials, is being accumulated and studied. Information is presented for Nb(D-31), Mo-0.5Ti, Rene 41, and W. Composition and physical properties are summarized for welding tip materials: Astroloy, Udimet 700, Udimet 500, NIMONIC 115, and Nicrotung. A tension-shell transducer unit with increased power-handling capacity was designed, and an acoustic absorber was assembled and utilized. An Al-bronze coupler element was fabricated for a 2-kw ultrasonic welder. (Author)

AD-277 809 Div. 26, 17, 14
(TISTM/TCG) OTS price $3.60

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT OF 2400 F FORGING DIE SYSTEM.
Interim technical progress rept., 28 Mar-27 June 62,
by H. Nudelman, A. H. Murphy and others.
July 62, 24p. incl. illus. tables.
(Contract AF 33(600)42861, ASD Proj. 7-886)
(ASD TR 7-886, vol. 5)
Unclassified report

DESCRIPTORS: *Forging, *Dies, *High temperature research, *Nickel alloys. Materials, Heat resistant alloys, Chromium alloys, Steel, Refractory materials, Ceramic materials, Metal coatings, Design, Oxidation, Fracture (Mechanics), Failure (Mechanics), Titanium compounds, Borides, Silicon compounds, Carbides, Manufacturing methods.

The upper operating temperature limit of Inconel 713C forging dies was determined by progressively increasing the load and temperature conditions. Ultimate failure occurred by gross cracking at 1900 F under a 1000-ton load while forging steel. During the research to reduce the requisite number of die sequences by an extrusion-forging technique, the die was destroyed. The die design was modified and rebuilding is under way. Prototype construction of a 2400 F system has begun, with the ultimate decision concerning die material still pending. (Author)

27. PROPULSION SYSTEMS

AD-277 545 Div. 27
(TISTA/SEB) OTS price $1.60

Arde-Portland, Inc., Paramus, N. J.
COOLED SOLID PROPELLANT ROCKET NOZZLES.
Summary rept. no. 3, 1 Jan-31 Mar 62,
by Philip Wacks. 31 Mar 62, 17p. incl. illus.
(Contract DA 30-069-ORD-3099)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles - Liquid cooled, *Lithium - Coolants. Solid rocket propellants, Rocket motors, Liquid metals, Flowmeters, Cooling, Film cooling, Sprays, Convection, Instrumentation, Test methods.

The feasibility of applying liquid rocket engine cooling techniques to solid rocket nozzles is being studied. Some of the more promising techniques using liquid lithium as the coolant are being investigated. Operational tests of the lithium flow console assembly were completed. Instrumentation of the convective cooled nozzles was completed. A stainless steel sleeve incorporating a labyrinth seal which will be used to join the instrumented nozzle to the condenser has been designed and released for procurement. The reworked spray film cooled nozzle was received and subjected to cold flow tests. Procurement of long lead time items for the spray film cooled nozzle console has begun. (Author)

AD-277 606 Div. 27, 9
(TISTA/GEC) OTS price $6.60

Jet Propulsion Center, Purdue U., Lafayette, Ind.
CALCULATION OF FLOW CHARACTERISTICS FOR TWO-PHASE FLOW IN ANNULAR CONVERGING-DIVERGING NOZZLES,
by D. W. Netzer. June 62, 55p. incl. illus. tables, 12 refs. (Rept. no. TM-62-3)
(Contract Nonr-110021)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles - Configuration, *Exhaust gases - Fluid flow. Injection, Drops, Gas flow, Liquids, Velocity, Pressure, Thrust, Theory, Mathematical prediction, Mathematical analysis.

An analytical method is presented for determining the flow characteristics of a two-phase flow of liquid drops in a gas stream as the mixture expands through an annular converging-diverging nozzle. The subject analysis can be utilized to predict the liquid velocity, gas velocity, static pressure, and droplet diameter as a function of axial distance along the nozzle for a two-phase flow that contains approximately 10 times as much liquid as gas by weight. Two nozzle configurations were investigated. Both had the same converging angle of 20 degrees, throat radius of 1 in., inlet area of 3.287 sq. in., throat area of 0.267 sq. in. and exit area of 2.450 sq. in. One nozzle had a total diverging angle of 7 degrees and the other had a total diverging angle of 21 degrees. Flow rates of between 8 and 11 lb/sec of water and between 1.0 and 1.3 lb/sec of air were utilized. The liquid and gas were expanded from a low velocity and a pressure of 500 psig to ambient pressure. The theoretical and experimental pressure profiles matched closely for both nozzles investigated. The thrust was predicted to an accuracy of approximately 3% for the short nozzle, but to an accuracy of only approximately 20% for the long nozzle. (Author)

AD-277 752 Div. 27, 12
(TISTA/SEB) OTS price $6.60

United Technology Corp., Sunnyvale, Calif.
DEVELOPMENT OF NONDESTRUCTIVE TESTING TECHNIQUES FOR LARGE SOLID-PROPELLANT ROCKET MOTORS.
Quarterly progress rept. no. 1, 1 Mar-31 May 62,
by Charles Harris. 31 May 62, 57p. incl. illus. tables, 10 refs. (Publication no. UTC 2015-QP-1)
(Contract AF 04(611)8018)
Unclassified report

DESCRIPTORS: *Non-destructive testing, *Rocket motors - Test methods. Solid rocket propellants, Pressure, Quality control, Porosity, Ultrasonics, Photographic analysis, Radiographic analysis, Test equipment, Fracture (Mechanics).

The capabilities of nondestructive test methods for the detection of critical defects in large solid-rocket motors is being studied. An analytical study of defects revealed the sizes of defects expected to be critical. Further analysis is concerned with the growth of defects during firing. The critical dimensions of a crack in propellant (critical from the standpoint of causing localized sonic flow) were predicted. These dimensions are being evaluated as condi-

of dehydration variables on the quality of freeze-dried cooked sliced beef are given. The variables investigated were platen temperature, dehydrator pressure, pre-freezing vs. evaporative freezing, and overdrying. Platen temperature by itself and overdrying had no significant effects on the tenderness, cuttability, or juiciness of the product. Evaporative freezing and higher dehydrator pressures were found to adversely affect the product. The work reported is part of a larger study which includes the effect of both pre-dehydration and dehydration variables on tenderness and other acceptance criteria, the study of other methods for attaining optimum tenderness such as enzyme treatments, the investigation of objective methods for determining tenderness in the final product, and the study of other meats such as pork. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-277 507 Div. 30, 12
(TISTP/WH) OTS price $3.60

New York U. Coll. of Engineering, N. Y.
APPROXIMATELY OPTIMUM CONTROL OF AN INERTIAL PLATFORM WITH RANDOM DISTURBANCES,
by F. J. Alexandro, Jr. and S. S. L. Chang.
Nov 61, 35p. incl. illus. 8 refs. (Technical rept. no. 400-43)
(Contract AF 49(638)586, Proj. 9768)
(AFOSR-1974) Unclassified report

DESCRIPTORS: *Control systems, *Servo systems. Torque, Loading, Electronic equipment.

A number of techniques are discussed which can be used to modify the bang-bang principle in order to overcome some common problems such as finite gain, random inputs, and minor time constants, namely: automatic dual mode, provision for reserve torque, and means for incorporating lag compensation. An example is given in which the methods are incorporated into an approximate bang-bang system to control an inertial platform. (Author)

AD-277 520 Div. 30, 15
(TISTP/JW) OTS price $5.60

RAND Corp., Santa Monica, Calif.
TWO OPERATORS FOR DETERMINING AGREEMENT (FOR AUTOMATIC SYNTACTIC ANALYSIS),
by I. A. Mel'chuk, tr. by Dolores V. Mohr.
June 62, 47p. incl. tables, 3 refs. (Research memo. no. RM-3190-PR) Unclassified report

DESCRIPTORS: *Translations, *Social communication, *Language. Computer logic, Programming, Machine translation, Vocabulary, Operators (Mathematics).

Two interrelated programs are presented for automatic analysis of Russian sentences -- or of sentences in any language characterized by grammatic agreement among certain word classes which must be tested in order to derive the proper syntactic structure for each sentence being processed. (Author)

AD-277 529 Div. 30
(TISTP/FR) OTS price $4.60

Texas U., Austin.
SYSTEM CONTROL. PROGRAMMING REFERENCE MANUAL,
by Ronald W. Jonas. June 62, 48p. incl. table.
(Rept. no. LRC 62-TP1)
(Contract DA 36-039-sc-78911) Unclassified report

DESCRIPTORS: *Magnetic tape, *Machine translation, *Programming. Digital computers.

The System is composed of the programs needed for utility and production functions and the Control Program, CP, which coordinates their operating activities. CP receives its instructions from a sequential list of operations which is keypunched as a control deck and loaded on a Control Tape. The list of control operations may be designed to produce any desired relationship between programs within the System. CP is composed of two main segments: the Compiler and the Interpreter The Compiler reads from the Control Tape and compiles a stored System Program. When the System Program has been formed, the Control Tape is no longer required. At this point the Interpreter takes control. The latter operates the stored System Program and records its operational history. All other programs of the System, called subprograms, act as subroutines in the System Program and their input-output activities are supervised by CP. (Author)

AD-277 563 Div. 30, 5
(TISTB/AW) OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 5, INFORMATION PROCESSING.
Quarterly progress rept., 1 Mar-31 May 62.
15 June 62, 13p. 6 refs.
(Contract AF 19(604)7400)
(AFESD TDR 62-98) Unclassified report

DESCRIPTORS: *Data processing systems - Design, *Digital computers - Design, *Reports. Circuits, Telephone communication systems, Solid state physics, Transition elements, Voice communication systems, Speech representation, Speech transmission, Computers, Magnetic materials, Electronic equipment, Mathematical analysis, Films, Memory devices.

AD-277 628 Div. 30
(TISTP/FR) OTS price $10.50

Technical Operation:, Inc., Washington, D. C.
THE TECH/OPS SERIES ON PROGRAMMING SYSTEMS
CL-II: A GENERAL PURPOSE SYNTAX DIRECTED COMPILER,
by G. O. Collins, Jr. and S. Warshall. July 61, 1v. incl. illus. (Staff memo. no. 61-5)
(Contract AF 33(600)41896) Unclassified report

DESCRIPTORS: *Programming. Language, Digital computers.

A novel organization for a compiler was designed which will allow translation of a large variety of problem-oriented algorithmic languages such as ALGOL, JOVIAL, etc. into the machine codes of most large computers. The compiler is controlled by a collection of tables which describe the formation rules and grammar of the input language as well as the peculiar characteristics of the target computer. A prototype of the compiler has been constructed and experiments performed to test the adequacy of the design concepts. Results have demonstrated the soundness of the design. Certain desirable modifications needed in an operational version of the compiler are discussed. Appendices give detailed flow charts and descriptions of the components of the prototype. (Author)

DESCRIPTORS: *Optical tracking, *Gun turrets. Design, Tests, Azimuth, Human engineering.

Two modes of gun turret operation were compared for their relative effects on tracking performance. Twenty subjects were used, arranged in two separate groups of ten subjects. Each group was assigned to a single mode of gun turret operation only. One mode of turret operation was termed fully articulated; the manned turret moved both in azimuth and elevation in response to operator hand control movements. The second mode of turret operation was termed partially articulated; in response to the hand controls of the operator who manned the turret, the turret moved in azimuth, but only the sight moved in elevation, rather than the complete turret. The results of the data analysis, based on 20 test target runs per subject, following 52 practice target runs, indicated that there were no significant differences in tracking performance attributable to the dissimilarities between the two modes of turret operation. (Author)

AD-277 916 Div. 28
(TISTB/AW) OTS price $1.60

Human Engineering Lab., Aberdeen Proving Ground, Md.
AN INVESTIGATION COMPARING THE RELATIVE EFFECTS OF TWO MODES OF GUN TURRET OPERATION ON TRACKING PERFORMANCE: STUDY II,
by Harry L. Snyder, Lynn C. Oatman, and Harold C. Wallach. Apr 62, 15p. incl. illus. tables, 6 refs. (Technical memo. no. 5-62)
Unclassified report

DESCRIPTORS: *Optical tracking, *Gun turrets. Design, Tests, Azimuth, Human engineering.

Two modes of gun turret operation were compared in a study of facilitating tracking performance. Twenty subjects were used, arranged in two separate groups of ten subjects. One group was assigned to each mode of gun turret operation. One mode of turret operation was termed fully articulated; the manned turret moved both in azimuth and elevation in response to operator hand control movements. The second mode of turret operation was termed partially articulated; the manned turret moved in azimuth, but the sight alone moved in elevation. The results of the data snalysis indicated that, over the 56 target runs each subject tracked, there were no significant differences in tracking performance between the two modes of turret operation. However, the interaction between mode and trials was significant. (Author)

AD-277 936 Div. 28
(TISTB/MS) OTS price $1.60

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
THE LENGTH AND DIRECTION OF RATING SCALES.
Interim rept. on Human Factors in Quartermaster Corps Operations,
by Richard W. Seaton. June 62, 17p. incl. illus. tables, 21 refs. (QMFCIAF rept. no. 11-62)
Unclassified report

DESCRIPTORS: *Psychometrics, *Taste - Tests. Food, Reliability, Statistical analysis, Design, Perception, Measurement, Printing.

Reliability of preference differences among homogeneous and heterogeneous food samples was studied as a function of two rating-scale variables, physical length and vertical vs. horizontal printing. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-277 690 Div. 29
(TISTB/AW) OTS price $1.25

American Foundation for Biological Research, Madison, Wis.
REHYDRATION OF FREEZE-DRIED MEAT.
Rept. no. 8 (Final), 11 June 59-10 June 61, by Basile J. Luyet, Alan P. MacKenzie and others. 10 June 61, 49p. incl. illus. tables, 8 refs.
(Contract DA 19-129-qm-1413)
Unclassified report

DESCRIPTORS: *Freeze drying, *Dehydrated substances. Dehydration, Food, Meat, Muscles, Fibers, Cooling, Ice, Air, Water, Carbon dioxide.

The mechanism of rehydration of freeze-dried muscle tissue depends, to a large extent, on the structural modifications the tissue has undergone. These, in turn, are chiefly dependent on the cooling rates during the freezing phase of the freeze-drying process. Accordingly, the work is divided into two parts: (1) The structure of freeze-dried muscle tissue, as dependent on the cooling rates; and (2) the mechanism of rehydration of freeze-dried muscle tissue. Two cases are studied: (1) freezing which is relatively slow and the formation of extracellular ice causing a dehydration of the fibers and (2) freezing which is rapid enough to produce intracellular ice. Rehydration of whole pieces of tissue and rehydration of single fibers are treated in Part 2. Two supplements deal with (1) the effects of freeze-drying on the muscle protein actomyosin and (2) differences in freeze-dried muscle tissues of various animals. (Author)

AD-277 935 Div. 29
(TISTB/AW) OTS price $2.60

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
THE NUTRIENT COMPOSITION OF THE MEAL, COMBAT, INDIVIDUAL.
Interim rept.,
by Miriam H. Thomas. June 62, 22p. incl. tables. (QMFCIAF rept. no. 12-62)
Unclassified report

DESCRIPTORS: *Military rations. Nutrition, Diet, Combat, Analysis, Tests.

The components of an individual combat meal were analyzed for their nutrient composition on a contractural basis. The data obtained were reported and compared with data previously obtained by the Institute. (Author)

AD-277 937 Div. 29
(TISTB/AW) OTS price $1.60

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
EFFECT OF DEHYDRATION VARIABLES ON THE QUALITY OF FREEZE-DRIED COOKED SLICED BEEF.
Interim rept.,
by J. M. Tuomy, R. J. Lechnir, and Terrance Miller. June 62, 16p. incl. tables (QMFCIAF rept. no. 14-62)
Unclassified report

DESCRIPTORS: *Dehydration, *Freeze drying. Beef, Temperature, Pressure, Evaporation, Freezing, Enzymes, Acceptability, Quality control.

Results of a factorial experiment on the effects

DESCRIPTORS: *Calorimeters, *Vaporization, Design, Vacuum systems, Test methods, Thermodynamics, Hydrocarbons, Octanes, Propyl radicals, Sulfides, Benzenes, Thiols, Heat of sublimation, Determination, Phenyl radicals, Acetamides, Test equipment, Low pressure research.

A method for the experimental determination of heats of vaporization at 25 C of substances exerting a vapor pressure in the range .01 mm Hg has been developed. A micro-calorimeter was constructed in the form of a Knudsen cell from which the substance was evaporated into high-vacuum. With a charge of about 300 mg of sample usually 5 to 8 consecutive experiments were performed. The vaporization heat was electrically compensated. The even-numbered n-alkanes from octane to hexadecane served as test substances. A further control was obtained by measuring heats of vaporization of n-propyl disulfide and benzenethiol. Heat of sublimation and vaporization values were determined for solid and liquid samples of phenyl diacetamide, and the difference was compared to the experimentally determined heat of fusion. It is believed that, at present, the accuracy of the corrected results is at least 0.1 kcal/mole. At a vapor pressure of .001 mm, the error was found to be as much as 2-3 kcal/mole. It is likely that this discrepancy is due to the existence of a residual pressure close to the evaporation cup of the same order of magnitude as the vapor pressure of the substance. (Author)

AD-277 919 Div. 30
(TISTB/AW) OTS price $9.10

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
RUSSIAN STENOWRITER SYSTEM.
Final rept.,
by L. R. Micklesen, N. Alferieff and others.
15 Apr 62, 103p. incl. illus. tables.
(Contract AF 30(602)2466)
(RADC TDR 62-225) Unclassified report

DESCRIPTORS: *Machine translation, *Data processing systems - Design. USSR, Language, Vocabulary, Automation, Dictionaries, Cybernetics, Coding, Feasibility studies, Typewriters.

The state of development of the Russian Stenowriter System is considered. The primary objective is to evaluate the feasibility of such a system and to establish the guide lines for further development work. The report is divided in five sections. The first is an Introduction giving a general description of the problems involved. Sections two, three and four deal with a detailed description of the work accomplished, knowledge gained and the attitudes adopted. Specifically, section two covers the area of the Code Assignment and Dictionary Compilation, section three deals with the Systems and equipment aspects of the project, while section four is devoted to the Computer Tutoring of English Stenotypy and its application to the Russian Stenowriter System. The last section is a summary of the work accomplished and of the immediate tasks ahead. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-277 828 Div. 31
(TISTE/CDM) OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
ARMORED WHEELHOUSE FOR PROPULSION UNIT OPERATORS,
by J. E. Smith. 18 June 62, 18p. incl. illus.
(Technical rept. no. R 206)
(Proj. Y-F015-11-311)
Unclassified report

DESCRIPTORS: *Barges - Shelters, *Floats - Shelters, *Battle shelters - Design, *Ocean going tugs. Armor plate, Human engineering, Safety devices, Pilots, Naval personnel, Tests, Amphibious operations, Marine engines.

An armored wheelhouse was developed for operators of propulsion units on pontoon barges who are unprotected from steel fragments and small-arms fire. It is for use with the 02D, 06DH, and 9D200 propulsion units. The prototype was tested operationally. On the basis of the test programs, it was concluded that the armored wheelhouse meets design objectives. Also presented is an alternate wheelhouse designed for use on warping tugs. (Author)

AD-277 914 Div. 31, 9
(TISTE/CAM) OTS price $1.60

Norwegian Ship-Model Experiment Tank, Trondheim.
SURFACE PIERCING HYDROFOILS WITH SELF ADJUSTING INCIDENCE AND SHOCK ABSORBERS,
by J. K. Lunde and H. AA. Walderhaug. 1962, 7p. illus.
(Contract N62558-2896)
Unclassified report

DESCRIPTORS: *Hydrofoils. Hydrofoil boats, Vibration isolators, Hydrodynamics, Lift, Drag, Stability, Model tests, Mathematical analysis.

Model tests in still water and in waves have been conducted with a surface piercing hydrofoil with self adjusting incidence and fitted with shock absorbing springs. Lift, drag, pitching and heaving have been recorded. Test results are given in sketches and diagrams. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-277 521 Div. 32
(TISTB/AW) OTS price $4.60

RAND Corp., Santa Monica, Calif.
THE EUROPEAN COAL AND STEEL COMMUNITY,
by R. T. Nichols. June 62, 38p. incl. tables, 9 refs. (Research memo. no. RM-3107-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Commerce, *Economics, *Europe. Coal, Steel, Steel industry, Control, Costs, Transportation, Management engineering, Belgium, Great Britain, France, Germany, Italy, Netherlands.

In 1952, the Inner Six countries of Europe (Belgium, France, West Germany, Italy, Luxembourg, and the Netherlands) ratified a treaty establishing the European Coal and Steel Com-

Division 30-RESEARCH AND RESEARCH EQUIPMENT

AD-277 680 Div. 30, 8
(TISTP/FR) OTS price $12.00

RCA Industrial Electronic Products, Camden, N. J.
PROJECT LIGHTNING.
Interim research rept. no. 12A, 1 Sep-30 Nov 61, on High-Speed Data Processor System Research.
30 Nov 61, 168p. incl. illus. tables.
(Contract NObsr-77523)
Unclassified report

DESCRIPTORS: *Digital computers, *Computer logic, *Memory devices. Delay circuits, Diodes, Coaxial cables, Resistors.

The prime concentration was upon both memory and logic subsystem construction. At the present time, nearly 65% of the required wafers for the logic subsystem are constructed and tested; and as normal to worst-case designs, wafer performance is near the minimum side of the specifications. Both logic and memory subsystems are well underway in construction, and schedules have been laid out for the peripheral circuitry to be added to the memory. A complete re-scheduling of both the memory and the logic subsystems was done since the original planning periods were essentially completed. (Author)

AD-277 681 Div. 30, 8
(TISTP/FR) OTS price $10.50

RCA Industrial Electronic Products, Camden, N. J.
PROJECT LIGHTNING.
Suppl. to Interim research rept. no. 12A on High-Speed Data Processor System Research.
1 Dec 61, 132p. incl. illus. tables (Suppl. to Interim research rept. no. 12A, AD-277 680)
(Contract NObsr-77523)
Unclassified report

DESCRIPTORS: *Diodes, *Computer logic, *Memory devices. Germanium, Gallium compounds, Arsenides, Triggered gates, Electric connectors, Resistors.

AD-277 695 Div. 30, 3
(TISTM/TCG) OTS price $1.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
THE AEROSOL CATCHER, A RAPID SAMPLING DEVICE FOR AEROSOLS,
by Albert Pfeiffer. Feb 62, 15p. incl. illus. table (CRDLR special pub. no. 1-35)
Unclassified report

DESCRIPTORS: *Aerosols - Sampling, *Test equipment. Test methods, Design, Theory, Tests.

This report describes a rapid sampling device for aerosols, the aerosol catcher, and includes its use and some results of its application in field tests. This device catches an aerosol sample by a rapid closing of an open box that moves transversely to the direction of motion of an aerosol cloud. It is generally independent of cloud-flow conditions, and allows extremely short sampling times.

AD-277 696 Div. 30
(TISTA/VGW) OTS price $6.60

Aerospace Corp., El Segundo, Calif.
THE DESIGN, IMPLEMENTATION, AND OPERATION OF A PERT SYSTEM ON A SPACE PROGRAM,
by Edward T. Bobak. Feb 62, 55p. incl. illus.
(Rept. no. TDR 930(2408)TR-2)
(Contract AF 04(657)930)
(DCAS TDR 62-65) Unclassified report

DESCRIPTORS: *Research program administration, *Air force research, *Guided missile research. Satellite vehicle research, Scheduling, Data processing systems, Analysis, Effectiveness.

This report summarizes and evaluates the experience gained during a ten-month period spent in developing a PERT system of management control for use in an Air Force space program. The design, implementation, and operation of TOPS (The Operational PERT System) are discussed, with special emphasis on system requirements, design considerations, and practical problems which presented themselves during the evolution of the system. The development of the program network, the data processing function, the training program, the reporting and analysis cycles, and the simulation process are reviewed. Also included is a critical appraisal of the system in terms of both the mechanical and the human factors influencing its success. Personnel relationships, communications, and attitudes manifested by the participants are considered. It is concluded that the experience was a successful one, particularly in regard to its generation of disciplined planning, but the same of the potential benefits of PERT were not fully realized in this application. Recommendations for improvement are made for the benefit of those managers who are considering the use of PERT on other programs. (Author)

AD-277 701 Div. 30, 8
(TISTE/CDM) OTS price $5.60

Air Force Cambridge Research Labs., Bedford, Mass.
ON STABILITY IN THE HOMEOSTAT JENNY.
Technical note no. 2,
by Harvey G. Miller and George G. Haroules.
Mar 62, 49p. incl. illus. tables, 8 refs.
(AFCRL-62-133)
(Proj. 5632) Unclassified report

DESCRIPTORS: *Analog computers, *Servomechanisms, *Electronic equipment - Stability. Machines, Cybernetics, Tests, Mathematical analysis, Probability, Differential equations, Integral transforms, Alternating current.

A study was made of the stability in the Homeostat Jenny. The mathematical tools of electronic servomechanism engineering were applied to the homeostat. The prime objective was the general illumination of the adaptive process as it occurs in this machine. The secondary objective was to develop an approach for realizing the full capabilities and for appreciating the limitations of the machine, and for optimizing future similar machines. Transfer functions and stability criteria are developed for the homeostat, considering configurations of one, two, three, and four main variable elements. Using function mapping techniques probability is derived that any state will meet stability criteria. This probability is extended to give most probable length of search for a stable state. (Author)

AD-277 721 Div. 30, 25
(TISTM/TCG) OTS price $3.60

Lund U. (Sweden).
DESIGN, CONSTRUCTION AND TESTING OF A HEAT OF VAPORIZATION CALORIMETER USEFUL IN THE VAPOR PRESSURE RANGE 1 TO 0.01 MM Hg AT 25 C.
Final technical rept.,
by Stig Sunner. 21 June 62, 22p. illus. 9 refs.
(Rept. no. 1)
(Contract DA 91-591-EUC-1699)
Unclassified report

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterisk

are included in the subject index.

BIBLIOGRAPHY

OTS SB-418 Suppl. 1 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
SOLAR ENERGY APPLICATIONS. Jan 62, 8p. 110 refs.
OTS Selective Bibliography SB-418 Suppl. 1.

DESCRIPTORS: *Solar energy, *Bibliography, Thermal diffusion, *Solar furnaces, Photochemistry, *Solar cells, Silicon, *Sea water, *Desalination, Distilling plants, *Solar batteries.

Lists 110 reports and translations added to the OTS collection during the period July 60 to Jan 62. Covers research on measurement of thermal diffusivity using a solar furnace, photochemistry in a solar furnace, silicon solar cells, solar energy converters and generators, solar stills, solar distillation of sea water, and solar batteries among other subjects. (Author)

Order from GPO $1.00 as
LC 33.2:So8

Science and Technology Div., Library of Congress, Washington, D. C.
SOVIET SCIENCE AND TECHNOLOGY. A BIBLIOGRAPHY ON THE STATE OF THE ART, 1955-1961, by Robert M. McCollum. 1962, 209p. 2000 refs.

DESCRIPTORS: *Bibliography, *Science, *Technological intelligence, USSR.

This bibliography resulted from the increasing interest in Soviet scientific and technical developments. It is intended to provide librarians, students, and researchers with a basic source for the preparation of comprehensive surveys of Soviet science and technology or the initiation of studies of particular fields of science and technology in the Soviet Union. The bibliography contains approximately 2000 annotated entries for periodical and monographic materials from Soviet bloc and Western sources published for the most part in the period 1955-1961. References selected for inclusion fall into four main categories: bibliographies; surveys; reports on visits; and articles deemed to show significant progress in a particular field.

AGRICULTURE

Order from GPO $1.25 as
A77.219/2:12

Agricultural Research Service, Beltsville, Md.
INDEX-CATALOGUE OF MEDICAL VETERINARY ZOOLOGY, SUPPLEMENT 12; AUTHORS, A TO Z, by Mildred A. Doss, Judith M. Humphrey, and Dorothy B. Segal. June 62, 353p. 10,590 refs.

DESCRIPTORS: Animals, *Veterinary medicine, *Bibliography, Indexes, Catalogs.

ASTRONOMY

Astrophysics

Order from GPO $0.40 as
NAS 1.12:120

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
THEORETICAL DETERMINATION OF THE FORM OF THE HOLLOW PRODUCED IN THE SOLAR CORPUSCULAR STREAM BY INTERACTION WITH THE MAGNETIC DIPOLE FIELD OF THE EARTH, by John R. Spreiter and Benjamin R. Briggs. 1961, 27p. 15 refs. NASA Technical rept. R-120.

DESCRIPTORS: Sun, *Solar flares, *Terrestrial magnetism, Magnetism, Magnetic fields, Dipole moments, Gas ionization, Hypersonic flow, Magnetic storms, Theory

The interaction between a neutral stream of ionized solar corpuscles and a three-dimensional magnetic dipole representing the geomagnetic field is investigated. It is assumed that the stream is confined to the exterior and the magnetic field to the interior of a hollow, the boundary of which is defined by a thin current sheath. An approximate method of solution is applied, and results are presented for the coordinates of the trace of the boundary of the hollow in the meridian plane containing the sun-earth line and the dipole axis for several relative orientations. Results are also presented for the trace in the equatorial plane for the case in which the dipole axis is normal to the sun-earth line. The corresponding problem in two dimensions is also considered, and it is shown that the analogous approximate results are in good agreement with the results indicated by an exact solution of the same basic equations. (Author)

NASA N62-10559 $1.60

Michigan U., Ann Arbor.
RADIO CHARACTERISTICS OF LUNAR SURFACE MATERIAL, by K. M. Siegel. Rept. on Grant NsG-4-59. [1961] 11p. 13 refs.

munity. The principal aim of the treaty was to transfer control of the coal and steel industries from the member governments to organs of the Community, in particular to the High Authority, a supranational executive and lawmaking body. A ''common market'' in coal and steel trade among the member states was to be created by the elimination of readily identifiable nationalistic trade barriers, such as tariffs, import quotas, subsidies, and discriminatory transport rates. By 1961, the common market features of the treaty had proved to be a great success: overt trade barriers had disappeared, and intracommunity trade in steel had quadrupled. On the other hand, the power of the High Authority to control the coal and steel industries had become negligible in comparison with the powers of control re-assumed, legally or illegally, by the governments of the individual member nations. (Author)

AD-277 676 Div. 32
(TISTP/FR) OTS price $28.50

Naval Ordnance Lab., White Oak, Md.
TABLES OF FOUR LETTER COMPUTER CODES USED IN LIBRARY RETRIEVAL PROGRAM,
by Eva Liberman and Hoyt L. Stevens. July 62, 676p. (NOLTR 62-50)
Unclassified report

DESCRIPTORS: *Coding. Naval research laboratories, Libraries, Information retrieval, Vocabulary.

The Library at the Naval Ordnance Laboratory, in its information retrieval program, analyzes technical reports and assigns descriptors covering bibliographic information and subject content of reports. A four letter code is associated with each descriptor and the code serves as input to the IBM 7090 computer. Tables of four letter alphabetical combinations were constructed to facilitate the assigning of computer codes to descriptors. The tables serve as a check list in assigning computer codes and avoid duplication since a separate code is used for each descriptor having a different meaning. The four letter codes may be used for any retrieval system requiring a machine language. (Author)

AD-277 708 Div. 32, 12, 1
(TISTA/GEC) OTS price $9.60

Department of the Army, Washington, D. C.
MISSILES AND VENTURES INTO SPACE PROGRESS REPORT 1961-1962.
June 62, 110p. incl. illus. (Pamph. no. 70-5-10)
Unclassified report

DESCRIPTORS: *Guided missile research, *Satellite vehicle research, *Bibliography. Guided missiles, Spaceships, Space capsules, Space probes, Space flight, Satellite vehicles, Lunar probes, Astronautics, Encyclopedias, Directories, Conferences, Symposia.

This report is a bibliography on missile science, rocket technology and space exploration with sections on space efforts of other countries including the USSR.

33. TRANSPORTATION

No Entries

Psychology

AD-281 936 $7.00

National Research Council, Washington, D. C. STUDENT RESPONSE IN PROGRAMMED INSTRUCTION. A SYMPOSIUM ON EXPERIMENTAL STUDIES OF CUE AND RESPONSE FACTORS IN GROUP AND INDIVIDUAL LEARNING FROM INSTRUCTIONAL MEDIA SPONSORED BY HEADQUARTERS, AIR RESEARCH AND DEVELOPMENT COMMAND, UNITED STATES AIR FORCE, ed. by A. A. Lumsdaine. 1961, 565p. 342 refs. Publication no. 943.

DESCRIPTORS: *Students, *Learning, *Teaching machines, *Programming, Stimulation, *Reaction (Psychology), *Education, Mechanics, Perception, *Films, *Vision, Motor reactions, Feedback, *Verbal behavior, Conditioned reflex, *Auditory perception. *Instructors.

Contents:
Learning complex sequential tasks from demonstration and practice
Motor, perceptual, and academic subject-matter learning
Studies on learning of paired-associates material

PB 160 386 $1.10

Naval Medical Research Inst., Bethesda, Md. SELECTION AND PRELIMINARY ADAPTATION OF RATS FOR WORK IN THE NMRI MULTIPLE CHOICE BOX, by Edward A. Lerome and Thomas J. Connor. Vol. 13, p. 985-992. 20 Dec 55, 8p. 2 refs. Research rept. on Project NM 000 019.01.03.

DESCRIPTORS: Rats, *Learning, *Reaction (Psychology), *Test equipment.

In order to obtain rats suitable for use in the NMRI Multiple Choice Box, 70 nonpedigreed rats were given, after preliminary familiarization with the box, a 10 minute trial to make two crossings for acceptance. Up to three trials were allowed before rejection. About 63 percent of the animals, with no reliable difference between sexes, were thus accepted. Six additional trials were given to these rats; 48 percent of them were eliminated. Given a sufficiently large supply of animals, this procedure is satisfactory. (Author)

BIOLOGICAL SCIENCES

PB 160 328 $1.60

Naval Medical Research Inst., Bethesda, Md. CORRELATION BETWEEN THE MEAN CORPUSCULAR VOLUME AND RETICULOCYTOSIS IN PHENYLHYDRAZINE ANEMIA IN SWINE, by F. Douglas Lawrason, D. C. Eltzholtz and others. Rept. no. 2 on Project NM 007 039. 16 Dec 47, 15p. 23 refs.

DESCRIPTORS: Drugs, *Hydrazines, *Phenyl radicals, *Anemia, *Reticulocytosis, Blood counts, Bone marrow, *Swine.

Six adult swine were given phenylhydrazine hydrochloride orally and intravenously. Hematologic observations which included periodic bone marrow studies were made before, during, and after the administration of the drug. Five swine responded to the drug in the usual manner with progressive anemia, reticulocytosis and erythrocytic hyperplasia of the bone marrow. Three animals died between the thirty-ninth and fiftieth day of the experiment after receiving 0.30 to 0.35 gm. per kilogram of body weight. Two swine survived and recovered after receiving a similar dose. The sixth animal died on the fourteenth day of the experiment after receiving only 4.4 gm. of phenylhydrazine. This pig exhibited a course which closely resembled that of benzol poisoning. Rapid and progressive granulocytopenia, anemia, and extreme universal hypoplasia of the bone marrow were observed. A direct correlation between the mean corpuscular volume of the red cell and the per cent reticulocytes was found within the limits of 0 to 80 per cent reticulocytosis. In these swine with each increment of 10 per cent in the reticulocytes the mean corpuscular volume increased approximately 6.8 cubic microns. (Author)

PB 160 829 $3.60

Psychology Lab., Illinois Inst. of Tech., Chicago. COMPUTATIONAL ANALYSES OF INTRA- AND INTER-WAVE VARIABLES IN HUMAN ALPHA: I. AMONG INTRA-WAVE COMPONENTS AS FUNCTIONS OF INTER-WAVE DISTANCE, by Ira G. Salisbury and Phil S. Surrager. Rept. on Contract AF 49(638)578. [1956] 37p. 6 refs. AFOSR TN-56-447; AD-96 792.

DESCRIPTORS: *Electroencephalography, Brain, Wave characteristics, *Wave analysis, Statistical analysis.

This study undertakes to determine whether or not variations in successive waveform components are systematic and to analyze the variations in components of successive waves rather than to show similarity or repetitiveness in successive total waveforms.

Anatomy and Physiology

AD-278 527 $0.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska. SEASONAL VARIATIONS IN THE CALORIC INTAKE OF DOGS LIVING IN AN ARCTIC ENVIRONMENT, by John L. Durrer and John P. Hannon. Oct 61, 13p. 12 refs. Technical rept. 61-33.

DESCRIPTORS: *Nutrition, Feeding, Dogs, Periodic variations, *Arctic regions, Climate

The seasonal variations in the average daily caloric intake and body weight of five Husky dogs and five Beagle dogs were measured over twelve and eight-month periods, respectively, during which the average monthly temperature ranged from +17° to -22° C. The caloric intake of the Huskies rose from a midsummer low of 49 Cal. /day to a November high of 87 Cal. /day. Mid- and late winter values averaged about 79 Cal. /day 79 Cal. /day. During late winter there was no relationship between the day to day temperature and caloric

PB 151 389 $1.25

National Bureau of Standards, Boulder, Colo.
AERODYNAMIC PHENOMENA IN STELLA ATMOSPHERES. A BIBLIOGRAPHY, ed. by Richard N. Thomas. 15 Sep 59, 89p. 445 refs. Technical note no. 30.

DESCRIPTORS: *Planetary atmospheres, *Aerodynamics, Plasma physics, Stars, *Astronomy, *Bibliography.

PB 151 379 $1.00

National Bureau of Standards, Boulder, Colo.
A PRELIMINARY ANALYSIS OF AMPLITUDE SCINTILLATIONS OF RADIO STARS OBSERVED AT BOULDER, COLORADO, by Robert S. Lawrence and James L. Jespersen. Rept. on Contract AF 04(647)134. July 59, 19p. 20 refs. Technical note no. 20.

DESCRIPTORS: *Atmospheric sounding, Ionosphere, Interferometers, *Radio astronomy, *Radio transmission, Frequency shift, *Stars.

Variations in the apparent flux from the radio source Cygnus-A are recorded at 53 and 108 mc/s using a two-element phase-sweeping interferometer located at Boulder. An ionospheric sounder operating at Ellsworth, Nebraska, provides simultaneous vertical-incidence measurements of the ionosphere along the path. Amplitude scintillations observed at Boulder over a six-month period are compared with the ionograms taken at Ellsworth. Positive correlation is found between amplitude scintillations and spread F, while a small negative correlation is found with sporadic E. The present result appears to be significant but a full year's data are being accumulated to disclose seasonal or diurnal effects. Detailed analysis of the scintillations indicates that the probability distribution of the amplitude can be represented by the Rice probability distribution function. The scintillation rate for 108 mc/s seems to be more rapid than for 53 mc/s. (Author)

PB 151 380 $0.75

National Bureau of Standards, Boulder, Colo.
VARIATIONS OF GAMMA CASSIOPEIAE, by S. R. Pottasch. Aug 59, 29p. 58 refs. Technical note no. 21.

DESCRIPTORS: Astronomical data, *Variable stars, Spectographic analysis, Density, Temperature, Rotation, Stars.

The variations of Gamma Cassiopeiae between 1890 and 1950 are summarized and discussed. The variations of visual magnitude, color temperature, radius and electron density of the shell, and the spectral variations are depicted. (Author)

BEHAVIORAL SCIENCES

PB 160 805 $1.60

Behavioral Sciences Lab. [Aeronautical Systems Div.] Wright-Patterson AFB, Ohio.
A DATA REDUCTION TECHNIQUE APPLIED TO THE DEVELOPMENT OF QUALITATIVE PERSONNEL REQUIREMENTS INFORMATION (QPRI) THE KEYSORT CARD SYSTEM, by Sidney Gael and Evan D. Stackfleth. Rept. on Weapon System Qualitative Personnel Requirements and Utilization. May 60, 9p. WADD-TN-60-133; AD-243 681.

DESCRIPTORS: *Punched card methods, Personnel, *Military personnel, Military requirements, Job analysis, Coding, Data processing systems, Training, *Military training.

AD-282 281 $2.25

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson AFB, Ohio.
A BIBLIOGRAPHY OF REPORTS ISSUED BY THE BEHAVIORAL SCIENCES LABORATORY: ENGINEERING PSYCHOLOGY, TRAINING PSYCHOLOGY, ENVIRONMENTAL STRESS, SIMULATION TECHNIQUES AND PHYSICAL ANTHROPOLOGY, by L. Jean Thomas. June 62, 85p. 815 refs.

DESCRIPTORS: *Bibliography, *Psychology, *Human engineering, *Education, *Stress (Psychology), Stress (Physiology), *Anthropology, *Personnel, Simulation, Anthropometry, Control systems, Maintenance, Statistical analysis, Training.

AD-282 016 $2.25

Melpar, Inc., Falls Church, Va.
ELECTRONIC REALIZATION OF FUNCTIONAL NERVE NETS, by E. B. Carne. Final rept. Dec 60-Jan 62, on Contract AF 33(616)7834. June 62, 95p. 3 refs. ASD-TDR-62-266.

DESCRIPTORS: *Cybernetics, *Behavior, *Learning, Machines, *Servomechanisms, Anatomical models, *Nervous system, Psychometrics, Perception, Positioning reactions, *Information theory, Control systems, Circuits, Nerves.

The self-organizing Binary Logical Network, a learning system using the reinforcement principle, is developed and used to formulate models of neurological subsystems. One of these systems, a maze running vehicle has been constructed as an experimental and demonstration device. A detailed description of the maze system is provided. (Author)

PB 160 877 $1.60

Naval Air Test Center, Patuxent River, Md.
INVESTIGATION OF COCKPIT SEATING, by C. S. White, R. D. Whitley, and J. B. MacGregor. Rept. no. 1 (Final), 12 Dec 45-10 Jan 46, on Proj. TED no. PTR 25124. 6 Feb 46, declassified. 19p. 1 ref. Serial no. TT-R-27.

DESCRIPTORS: Aircraft equipment, *Cockpits, *Aircraft seats, Parachutes, Human engineering.

The purpose of this investigation was to evaluate pilot comfort during long flights with various cockpit seating arrangements. It is concluded that distracting discomfort and attendant reduction in pilot efficiency may result from poor seating arrangements. It is recommended that BuAer Model SP-1 pilot seat pan and BP-1 pilot back pad replace current seat and back pads and that investigations continue in order to develop the optimum pilot efficiency and comfort in cockpit seating arrangements.

The results demonstrated that the isolated calf adrenal responds to ACTH with a marked increment in the production and release of corticoids, and that this response is dose-dependent, being significantly greater at a level of 1.00 than at 0.33 I.U/L. Moreover, ACTH appeared to induce a qualitative change in the pattern of secretion. Whereas the mean corticosterone outputs increased 40 and 80 percent, respectively, in 2 series of experiments, the corresponding increments in cortisol (17-OH corticosterone) were 122 and 183 percent, respectively. In contrast, beef STH (100 mg/L.), TSH (16.6 mg/L.) and FSH (50 Amour U/L.) each failed to influence either the total output or pattern of secretion of corticoids. It should be emphasized that the negative adrenocorticotropic findings vis-a-vis the latter hormones refer only to their direct and acute action on steroidogenesis. (Author)

PB 160 348 $1.60

Naval Medical Research Inst., Bethesda, Md.
THE INFLUENCE OF CERTAIN FACTORS PRESENT IN THE IN VITRO ASSAY ON THE RESPONSE PATTERN OF MOUSE ILEAL SEGMENTS, by Ellsworth B. Cook and W. R. Belew. Vol. 14, p. 521-532. 29 June 56, 11p. 4 refs. Research rept. on Project NM 006 012.04.97.

DESCRIPTORS: Mice, *Intestine, Tissues (Biology), *Perfusion, Laboratory equipment, *Recording devices, Kymography.

Data collected by use of a perfusion apparatus which permits the in vitro assay of 10 ileal segments simultaneously are utilized here to examine certain factors of the test situation for their possible influence on the pattern of tissue response. Statistical evidence is furnished to show that (1) minute mechanical differences which affect recording levers can be eliminated from consideration by expressing responses in terms of percent change from a base line of normal activity, (2) equilibration time (range 67-178 minutes) did not affect tissue activity, and (3) there were no significant differences in the weight of the test animals distributed between the two tissue chambers of the perfusion apparatus. However, the existence of a direct relationship between animal weight and height of tissue response emphasizes the importance of keeping animal weight within a narrow range. (Author)

PB 160 353 $1.60

Naval Medical Research Inst., Bethesda, Md.
THE INHIBITION STEROIDOGENESIS BY AMPHENONE "B": IN VITRO STUDIES USING THE PERFUSED CALF ADRENAL, George Rosenfeld and Willard D. Bascom. Vol. 14, p. 185-200. 1 Mar 56, 17p. 23 refs. Research rept. on Project NM 006 012.04.94.

DESCRIPTORS: *Adrenal glands, *Steroids, ACTH, Synthesis, *Metabolism inhibitors, Perfusion, Chromatographic analysis

The results demonstrated that Amphenone at concentrations varying from 7.5×10^{-5} M to 7.5×10^{-4} M caused depressions in the production (rather than release) of compounds F, E, and B by ACTH-stimulated adrenals varying from 40 to 90 percent. That a similar inhibition was exerted when exposed glands were perfused without added corticotrophin indicates that the depressant action is on the functional capacity of the adrenal cortical cells per se. The perfusion of various steroid substrates demonstrated that Amphenone induced reductions varying from 65 to 90 percent in the ability of the glands to carry out 11β-, 17α-, and 21-hydroxylations as well as the oxidation of the Δ^5-3β-hydroxyl to the Δ^4-3-ketone group. Thus, the previously observed impairment in the biosynthesis of compounds F, E, and B is attributable to a combination of defects in a variety of specific enzymatic reactions participating in steroidogenesis. The findings are discussed in relation to the reported in vivo actions of Amphenone, and a scheme of adrenocortical steroidogenesis is presented, showing the various individual enzymatic reactions inhibited by it.

PB 160 402 $2.60

Naval Medical Research Inst., Bethesda, Md.
SOME HUMORAL ASPECTS OF THE DEVELOPMENT OF TOLERANCE TO BACTERIAL PYROGENS IN RABBITS, by Richard S. Farr, Dan H. Campbell (California Inst. of Tech.) and others. Vol. II, p. 595-986. 14 Aug 53, 28p. 13 refs. Research rept. on Project NM 007 081.12.02.

DESCRIPTORS: *Pyrogens, *Bacteria, Salmonella, Escherichia, *Immunology, Typhus vaccine, *Body fluids, Serum, Plasma proteins, Rabbits

The pyrogenic effects of Salmonella typhi vaccine and a purified pyrogen from Escherichia coli, when injected intravenously into normal of pyrogen-tolerant rabbits, may be enhanced by incubation of the pyrogen with normal rabbit plasma or serum prior to injection. Under certain conditions, plasma and serum from rabbits rendered tolerant by repeated pyrogen injections, fail to produce this enhancement of fever response. The fact that under other circumstances tolerant plasma and serum will produce enhancement of the fever response indicates that tolerant serum is not completely lacking in the pyrogen-interacting substance of normal serum. Another possible explanation for the failure of tolerant serum to enhance the fever response to these pyrogens is the presence in tolerant serum of an inhibitor for the normal serum-pyrogen interaction or the effects of its product. That such an inhibitor does exist is indicated by experiments which show that both tolerant serum and gamma globulin extracted from tolerant plasma inhibit the enhancing effect of normal serum on the fever response to these two pyrogens. The changes in shape of fever curves produced by the inhibitor resemble those seen during the development of tolerance to these pyrogens. Evidence is presented to suggest the presence in the plasma from rabbits tolerant to typhoid vaccine of a second inhibitor capable of delaying, but not reducing, the fever response. These data suggest that the accumulation of humoral substances in the animal plays an important part in the development of tolerance to bacterial pyrogens. (Author)

AD-278 529 $0.50

Utah U. Coll. of Medicine, Salt Lake City.
DETERMINATION OF THE CRITICAL AMBIENT TEMPERATURE FOR MICE TREATED WITH CHLORPROMAZINE, by Stanley Marcus, Fred Miya and others. Oct 61, 11p. 6 refs. AAL Technical rept. 61-35.

intake. In the Beagles, acute and later chronic exposure to cold in March caused a marked increase (80 to 131 Cal. /day) in caloric intake. They, like the Huskies, tended toward minimum values (85 Cal. /day) during the summer. With the onset of winter the Beagles increased their intake to a high of 144 Cal. /day in November. Overall, these data showed that the relative magnitude of the seasonal changes were quite similar in both groups of dogs and suggested that seasonal changes in insulation are supplementary to seasonal changes in caloric intake. (Author)

AD-278 522 $0.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
SOME EFFECTS OF BODY HEATING PRIOR TO EXTREME COOLING, by Paul W. Barnett. Oct 61, 19p. 16 refs. Technical rept. 61-27.

DESCRIPTORS: *Body temperaure, Heat production (Biology), Cooling, *Exposure

This study was performed to determine the effect of body heating prior to extreme cooling. Subjects were heated in a 42°C water bath until heart rates reached 150 beats/minute or rectal temperatures reached 39.5°C. Subjects were exposed, following heating, to ambient air temperatures of 0°C for 30 minutes and -15°C for 60 minutes. No significant change in tolerance times was noted. Total body heating prior to exposure is an ineffective means of extending the human body's tolerance to extreme cold. A discussion of the results is presented. (Author)

PB 160 790 $1.60

Harvard [U., Cambridge, Mass.]
THE BASIC PHYSIOLOGY OF HIBERNATION AND ITS RELATION TO TEMPERATURE REGULATION AND TO ADAPTATION TO COLD, by C. P. Lyman. Rept. on Contract AF 33(038)18133. July 58, 20p. 24 refs. Technical note AAL-TN-58-11.

DESCRIPTORS: *Body temperature, *Hibernation, Nervous system, Blood, Physiology.

In looking at the study of hibernation as a whole, it appears that this study is important, both from the aspect of pure academic science and because it may add to our insight into physiological problems of more practical application. By studying hibernation and the preparation for it, some light may be shed on this problem as a whole. Very little is known concerning the changes which take place as the hibernator enters the hibernating state, yet these are intimately associated with the vast problem of heat production and conservation and may well shed light on the little known of sleep.

AD-278 523 $0.50

Kentucky U., Lexington.
TEMPERATURE COMPENSATION FOR THE MERCURY STRAIN GAUGE USED IN DIGITAL PLETHYSMOGRAPHY, by Nishio Honda. Oct 61, 12p. 7 refs. AAL Technical rept. 61-28.

DESCRIPTORS: Temperature, Pressure gages, Mercury, *Plethysmography, *Strain gages, *Medical equipment, *Blood circulation, Measurement

The temperature compensation for the mercury-in-rubber strain gauge by a copper wire was examined. It was found that the influence of a temperature change on the resistance of the mercury-in-rubber strain gauge can be adequately compensated for by a fine copper wire. A transient imbalance of the gauge circuit cannot be avoided after the exposure to abrupt temperature change. With the copper compensation wire described, the effect of a slow, irregular temperature change on the resistance of the gauge can be eliminated. The addition of the rubber tube as insulation markedly improves the time-course compensation with abrupt temperature changes. (Author)

PB 160 338 $1.10

Naval Medical Research Inst., Bethesda, Md.
THE IN VITRO INFLUENCE OF BACTERIAL PYROGENS ON THE ADRENOCORTICAL FUNCTION OF PERFUSED CALF ADRENALS, by George Rosenfeld. Vol. 13, p. 47-56. 29 Jan 55, 10p. 25 refs. Research rept. on Project NM 006 012.04.79.

DESCRIPTORS: Bacterial extracts, *Pyrogens, Saccharides, *Adrenal glands, Secretion, *Corticosteroids, ACTH.

The main objective of this investigation was the study of the biogenesis and secretion of corticosteroids by perfused calf adrenals, isolated from the metabolic influences of other tissues and exposed in vitro to purified, pyrogenic bacterial polysaccharides in order to ascertain their acute and direct effect on the adrenocortical secretory mechanism. The analytical data demonstrated that the purified, pyrogenic bacterial polysaccharides derived from Ps. aeruginosa, E. coli, and S. marcescens, (serologically unrelated bacteria), when perfused in citrated calf blood (200, 20, and 20 ug/1, respectively) through either unstimulated or ACTH-stimulated adrenals induced an acute inhibition of adrenocortical function, as evidenced by the diminution in the UV, PS, and FS corticoid outputs. The depressant effect exerted by these three bacterial products on the steroidogenic process was more evident when the exposed glands were maximally stimulated, and revealed mean depletions in output of 48.2, 51.3, and 40.5 percent respectively. Inasmuch as exposure to the pyrogenic substances caused comparable decrements in the UV, PS, and FS steroidal components it appears that their inhibitory action is not attributable to a specific biosynthetic defect but is exerted on at least several of the steroidogenic enzymatic systems. Similar concentrations of the same bacterial polysaccharides, if perfused through calf adrenals in a glucose-fortified, physiologically balanced and buffered salt solution, failed to deplete the steroid-producing capacity of exposed glands.

PB 160 340 $1.10

Naval Medical Research Inst., Bethesda, Md.
IN VITRO STUDIES OF THE INFLUENCE OF CORTICOTROPIN, SOMATOTROPIN, THYROTROPIN, AND GONADOTROPIN ON ADRENAL STERIODOGENESIS, by George D. Rosenfeld and Willard D. Bascom. Vol. 14, p. 575-580. 27 July 56, 6p. 3 refs. Research rept. on Project NM 006 012.04.102.

DESCRIPTORS: *Hormones, ACTH, *Adrenal glands, *Steroids, Synthesis

In the course of investigations concerning the effect of certain pancreatic extracts on the blood ketone levels of diabetic animals, it was necessary to adopt a procedure for accurate determination of acetone bodies on small amounts of blood. The method described makes use of 1 cc. of oxalated blood from which a tungstate filtrate is prepared. The filtrate is acidified to convert acetoacetate to acetone, and an acetone-containing fraction distilled off. The addition of salcylaldehyde to the alkaline acetone solution forms a red-brown color which is quantitatively determined in the Evelyn photoelectric colorimeter. The method is rapid and thus suitable for determinations in a large number of serially-drawn samples. It is considered accurate to within about 2 per cent when applied to moderately elevated blood levels, and somewhat less accurate in lower or normal ranges. (Author)

PB 160 316

Naval Medical Research Inst., Bethesda, Md.
A COLORIMETRIC METHOD FOR THE DETERMINATION OF CITRATE ION IN BLOOD AND PLASMA, by Paul D. Boyer and Gladys H. Wolcott. Rept. no. 1 on Project NM 007 027. 20 May 47, 14p. 12 refs.

DESCRIPTORS: *Citrates, Ions, Bromine compounds, Acetates, *Blood, Blood plasma, *Colorimetric analysis.

In the method described citrate ion is converted into the bromoacetone derivative by oxidation with permanganate under highly acid conditions and in the presence of free bromine. The bromoacetone derivative formed is extracted with petroleum ether, and the extract is carefully washed to remove all traces of bromide. The bromoacetone is decomposed and the liberated bromide is extracted from the petroleum ether by shaking with an aquaeous sulfite solution. The liberated bromide is oxidized to bromate with hypochlorite; the bromate formed is then allowed to react with iodide to liberate free iodine, using molybdate as a catalyst, and the yellow color of the liberated iodine is measured colorimetrically. (Author)

PB 160 318 $2.60

Naval Medical Research Inst., Bethesda, Md.
A COLORIMETRIC METHOD FOR THE DETERMINATION OF METHYL ALCOHOL IN BLOOD, TISSUE AND THE EXPIRED AIR, by C. H. Hine, T. E. Shea, Jr. and others. Rept. no. 1 on Project NM 007 031. 8 Apr 47, 24p. 10 refs.

DESCRIPTORS: Alcohols, *Methanols, *Tissues (Biology), *Blood, *Air, Respiration, *Colorimetric analysis, Dichromates.

A method is described based on the acid dichromate oxidation of methyl alcohol with colorimetric estimation of the chromate formed.

PB 160 323 $1.60

Naval Medical Research Inst., Bethesda, Md.
THE COMPOSITION OF SKIN AS COMPARED WITH MUSCLE, by Mackenzie Walser and Leonard J. Bodenlos. Vol. 12, p. 67-80. 22 Apr 54, 14p. 21 refs. Research rept. on Project NM 007 081.16.01.

DESCRIPTORS: Tissues (Biology), *Skin, *Muscles, Physiology, Chemical analysis, Fats, Water, Collagen, Sodium, Potassium, Chlorine

Established procedures of tissue analysis have been adapted to the analysis of skin samples weighing 1-3 gm. Values are given for the major constituents of the skin of rats, including fat, water, collagen, Na, K, and Cl. An average of 18 percent of the skin chloride lies outside of the sodium space and is therefore "non-extracellular" in rats. The fat-free non-collagenous solids (FFNCDT) of skin comprise 2 percent to 8 percent of the weight of fat-free skin. The skin potassium content is closely related to this quantity, suggesting that FFNCDT is proportional to the mass of parenchymal cells. Further evidence of the value of FFNCDT as a referent for intracellular constituents was obtained by comparing potassium in skin with potassium in muscle and potassium in the whole body in terms of this referent. The values are very similar (42, 38, and 39 mM/100 gm. FFNCDT). Intracellular water, on the other hand, varied in the three tissues examined: 426 gm/100 gm. FFNCDT in the skin, 271 gm/100 gm. FFNCDT in muscle, and 176-211 gm/100 gm. FFNCDT in the whole body. These observations permit comparison of the composition of skin, muscle, and the whole body with respect to the relative proportions in each of collagen, extracellular and intracellular water, and cell solids. (Author)

TID-16116 $11.00

Purdue U., Lafayette, Inc.
PATHWAYS OF CARBON DIOXIDE ASSIMILATION IN AUTOTROPHICALLY GROWING CELLS OF HYDROGENOMONAS FACILIS I. THE IDENTIFICATION OF ORGANIC AND AMINO ACIDS, by Norman Ellison Dewar. Master's thesis. June 55, 134p. 94 refs.

PB 160 388 $1.60

Naval Medical Research Inst., Bethesda, Md.
A SEMIMICRO METHOD FOR THE COLORIMETRIC DETERMINATION OF TISSUE LIPIDS, by Richard H. Weaver, Eugenia Tarver, and Gordon Fish. Rept. no. 1 on Project NM 007 030. 1 July 47, 14p. 11 refs.

DESCRIPTORS: *Lipids, Phospholipids, Cholesterol, Fats, *Colormetric analysis, *Microchemistry.

A rapid colorimetric method for the analysis of lipids in small amounts of blood and tissue is presented. The tissue is ground in sand with accepted fat solvents, filtered, and aliquots of the extract are used for subsequent determinations. Phospholipid is determined indirectly, cholesterol is determined by the Liebermann-Burchard reaction and total fats by oxidation with Nicloux's reagent and subsequent colorimetric estimation of chromate formed. (Author)

PB 160 397 $1.10

Naval Medical Research Inst., Bethesda, Md.
SODIUM-RETAINING MATERIAL IN CALF ADRENAL PERFUSATES, by George Rosenfeld, Frank Ungar (Worcester Foundation for Experimental Biology) and others. Vol. 13, p. 41-46. 29 Jan 55, 7p. 8 refs. Research rept. on Project NM 006 012.04.78.

DESCRIPTORS: Drugs, *Chlorpromazine, Mice, *Body temperature, Hypothermia, Hyperthermia, Temperature

Chlorpromazine can have a hypothermic or hyperthermic effect on the body temperature response of mice, depending upon the ambient temperature. The critical ambient temperature has been calculated to be approximately 33°C using two milligrams per kilogram of chlorpromazine in mice. The ambient temperature is an important factor that can bias the effect of drugs that influence body temperature and should be weighed accordingly when data are analyzed. The influence of other factors such as radiation, relative humidity and air motion has been discussed. (Author)

AD-278 531 $0.50

Utah U. Coll. of Medicine, Salt Lake City.
EFFECT OF ACUTE AND CHRONIC EXPOSURE TO LOW TEMPERATURES ON SURVIVAL OF MICE CHALLENGED WITH KLEBSIELLA PNEUMONIAE, by Stanley Marcus, Fred Miya and others. Oct 61, 11p. 8 refs. AAL Technical rept. 61-37.

DESCRIPTORS: *Bacteria, *Klebsiella pneumoniae, *Immunology, Bacterial vaccines, Antigens, Mice, *Body temperature, Viability, Temperature, Survival

Normal and immunized mice were subjected to acute and chronic stress of 2°C ambient temperature. Singly caged mice were adversely affected by the acute cold stress, but mice chronically cold-stressed were significantly protected by the immunization whether caged in groups or singly. Chronic cold stress did not decrease the ability of the animals to form agglutinin antibody. (Author)

AD-281 747 $0.50

Utah U. Coll. of Medicine, Salt Lake City.
EFFECT OF ACUTE AND CHRONIC LOW TEMPERATURE STRESS ON SURVIVAL OF MICE CHALLENGED WITH STAPHYLOCOCCUS AUREUS, by Stanley Marcus, Fred Miya and others. Oct 61, 13p. 17 refs. AAL Technical rept. 61-42.

DESCRIPTORS: *Bacteria, Staphylococcus, *Immunology, Bacterial vaccines, Antigens, Mice, *Body temperature, Viability

Normal and immunized mice were subjected to acute and chronic stress of 2°C ambient temperature. The mice were challenged with varying doses of Staphylococcus aureus, strain Fritchie. Immunization offered significant protection to mice kept at 21°C and to mice that were immunized, challenged and acutely exposed to 2°C in groups. No protection was observed in mice that were immunized, challenged and exposed as individuals to 2° C. Also, immunized mice that were chronically cold exposed at 2° C were not protected against subsequent challenge and showed equivocal mortality ratios compared to the normal controls challenged under the same conditions. (Author)

AD-278 530 $0.50

Utah U. Coll. of Medicine, Salt Lake City.
EFFECT OF AMBIENT TEMPERATURE AND CHLORPROMAZINE TREATMENT ON RESISTANCE OF MICE CHALLENGED WITH KLEBSIELLA PNEUMONIAE, by Stanley Marcus, Fred Miya and others. Oct 61, 12p. 8 refs. AAL Technical rept. 61-36.

DESCRIPTORS: Temperature, *Chlorpromazine, *Klebsiella pneumoniae, *Drugs, Reaction (Physiology), Mice, Bacteria, Immunology

The hypothesis that increased metabolic rates enhance the host resistance to infection was investigated. Chlorpromazine was used to induce the state of hypothermic stress without compensatory increase in metabolic rates. The results of the experiments showed that the ambient environment influences the toxicity of the drug itself. Chlorpromazine enhanced the death of mice challenged with Klebsiella pneumoniae, and an interpretation could be that the lowering of metabolic rates as a result of the drug injection was contributory to this effect. (Author)

AD-278 528 $0.50

Utah U. Coll. of Medicine, Salt Lake City.
EFFECT OF VARYING TEMPERATURES ON OXYGEN UPTAKE AND GENERATION TIME OF KLEBSIELLA PNEUMONIAE AND STAPHYLOCOCCUS AUREUS, by Stanley Marcus, Fred Miya and others. Oct 61, 12p. 2 refs. AAL Technical rept. 61-34.

DESCRIPTORS: Temperature, *Oxygen consumption, Metabolism, *Staphylococcus, *Klebsiella pneumoniae, Growth

A study of the effects of temperature on oxygen uptake and generation times of Klebsiella pneumoniae and Staphylococcus aureus was carried out. The results indicate that oxygen uptake varies directly with temperature and still occurs although no measurable growth takes place. The generation times of the agents appear to be independent of temperature between 25° and 37° C but are temperature-dependent at values below 25°C. The main effect of lower temperatures on growth rates appears to be that of increasing the lag phase. (Author)

Biochemistry

TID-16118 $17.50

Purdue U., Lafayette, Ind.
CHEMOAUTOTROPHIC ASSIMILATION OF $C^{14}O_2$ BY HYDROGENOMONAS FACILIS, by Norman Ellison Dewar. Doctoral thesis. Aug 62, 262p. 210 refs.

PB 160 315

Naval Medical Research Inst., Bethesda, Md.
A COLORIMETRIC METHOD FOR THE DETERMINATION OF ACETONE BODIES IN BLOOD, by Bernard Zimmerman and Felix J. Sabatino. Rept. no. 1 on Project NM 007 026. 14 Feb 48, 12p. 5 refs.

DESCRIPTORS: *Acetones, Ketones, Tungstates, *Blood, *Colorimetric analysis.

A successful attempt was made to develop a PABA-resistant strain of Rickettsia prowazeki by passing the Madrid E strain in eggs in moderately inhibitory concentrations of PABA. The susceptibility of the two strains to PABA was studied by comparing the survival times of infected chick embryos and the increment of rickettsiae in eggs which had received varying amounts of PABA.

The survival time of embryos infected with the parent strain was increased by amounts of PABA of 0.2 mg. or greater. An increase in the survival time of embryos infected with the resistant strain could not be clearly demonstrated with subtoxic amounts of PABA. The drug did not appear to influence the initial stages of infection with either strain, but 1 and 3 mg. markedly altered the course of increment of the parent rickettsiae in eggs. The increment of the resistant strain was changed very little, if at all, by 3 mg., but attainment of peak titer was delayed by 2 days with 10 mg.

Pathology

TID-13022 $2.60

Children's Cancer Research Foundation, Boston, Mass.
EFFECTS OF HEMORRHAGIC SHOCK ON VASCULAR PERMEABILITY TO RED BLOOD CELLS, by Isaac Djorassi, Albert Roy, and Sidney Farber. Rept. on Contract AT(30-1)-1753. 20 July 61, 23p. 11 refs. Prepared in cooperation with The Children's Hospital Medical Center and Harvard Medical School.

PB 160 309 $1.60

Naval Medical Research Inst., Bethesda, Md.
CHANGES IN INFECTIOUNESS OF MALARIAL GAMETOCYTES. I. PATTERNS OF OOCYST PRODUCTION IN SEVEN HOST-PARASITE COMBINATIONS, by Clay G. Huff and Dorothy F. Marchbank. Vol. 12, p. 481-494. 28 Oct 54, 14p. 12 refs. Research rept. on Project NM 005 048.01.09.

DESCRIPTORS: *Parasitic infections, *Malaria, *Disease carriers, *Mosquitoes, *Reproduction, *Birds, Plasmodium, Chickens, Pigeons.

Usually the infectiousness of the gametocytes fell rapidly in the latter portion of the infection in the bird even though in many instances the numbers of gametocytes were still increasing in the blood. The patterns of oocyst production in groups of mosquitoes fed on the infected birds on consecutive days were similar in the three species of parasites, except for a tendency of P. cathemerium to recover some of the infectiousness of its gametocytes on the third day after the beginning of its decline in infectiousness. There was some evidence that individual avian hosts produced some differences in size of oocysts developing in mosquitoes fed upon them.

PB 160 310 $2.60

Naval Medical Research Inst., Bethesda, Md.
CHANGES IN WEIGHT AND ASCORBIC ACID CONTENT OF THE ADRENALS IN GUINEA PIGS INFECTED WITH PNEUMOCOCCI, by E. P. Vollmer and M. M. Carey. Rept. on Proj. NM 007 081.02.07, formerly NM 007 024. 23 Nov 49, 29p. 63 refs.

DESCRIPTORS: *Adrenal glands, *Secretion, *Pneumococcus infections, *Ascorbic acid, Corticosteroids, Pathology, Water impingment, Therapy

Adrenal weight and ascorbic acid concentration were studied in guinea pigs infected intraperitoneally with type I Pneumococci. The data were interpreted to indicate that adrenal discharge is continuous during severe infection of this type and that the picture of adrenal depletion is consistent with the possibility of rapid and early exhaustion of the adrenal cortex.

PB 160 332 $1.60

Naval Medical Research Inst., Bethesda, Md.
THE COURSE OF PNEUMOCOCCAL INFECTION IN MICE DURING TREATMENT WITH ANTIBACTERIAL SUBSTANCES AND ADRENOCORTICAL EXTRACT, by Erwin P. Vollmer. 28 Nov 49, 15p. 47 refs. Rept. on Project NM 007 081.02.08, formerly NM 007 024.

DESCRIPTORS: *Pneumococcus infections, *Antibiotics, *Adrenal cortical extract, Therapy, Mice

Adrenal cortex extract has been shown to increase the survival time of mice injected with pneumococci. Three-hundred and forty Swiss mice were infected intraperitoneally with large doses of virulent Type I Pneumococci and kept on diets containing small quantities of antibacterial substances to prolong the infection. They were then injected repeatedly with either aqueous adrenocortical extract or non-pyrogenic saline solution. In each of two experiments the survival time of hormone-treated animals was greater than that of controls, although the terminal survival rates were not significantly affected. It was concluded that the exogenous hormone met an increased need for adrenocortical substances during the infection. The antibacterial substances used were sulfadiazine and two analogs of pantothenic acid. (Author)

PB 160 345 $1.10

Naval Medical Research Inst., Bethesda, Md.
INEFFECTIVENESS OF CORTISONE THERAPY IN MICE INFECTED WITH JAPANESE B ENCEPHALITIS, AND THE ADVERSE EFFECT OF HIGH DOSAGES, by E. P. Vollmer and Herbert S. Hurlbut. 9 Mar 51, 9p. 15 refs. Rept. on Project NM 007 081.02.10.

DESCRIPTORS: *Adrenal cortical extract, Therapy, *Encephalitis, Toxicity, Dosage, Mice

Moderate doses of adrenocortical extract or cortisone had no effect on Japanese B encephalitis virus infection in mice. On the other hand, larger doses of cortisone, capable of inhibiting growth in uninfected mice, also increased the mortality rate in infected mice. This was not a general steroid effect since testosterone in equivalently high dosage had no adverse effect. It was concluded that relative insufficiency of adrenocortical hormone was either not present in the virus-infected mice, or, if present, did not appreciably influence the course of infection, so that supportive therapy could not affect the outcome. The adverse effect of the high dose of cortisone on resistance was attributed to the metabolic results of overdosage. (Author)

DESCRIPTORS: *Adrenal glands, Perfusion, *Corticosteroids, *Sodium compounds, Fractionation, Chromatographic analysis.

Preliminary studies demonstrated that intact calf adrenals produced and secreted appreciable quantities of corticoids when perfused in vitro in a multicycle system at 37.5° C. with a glucose-fortified, physiologically balanced and buffered salt solution, gassed with 95 percent O_2/5 percent CO_2. Employing these conditions, groups of 4 glands were perfused for 2 hours with a liter of the artificial medium. The ethyl acetate extract of these adrenal effluents was fractionated by paper chromatography in the toluene-propylene glycol system, and the methanol-eluted cortisone zone containing aldosterone-like material rechromatographed in the benezene-ethylacetate-methanol-water system. The zone in the latter chromatogram corresponding in mobility to aldosterone and now free of all known active steroids including cortisone absorbed in the ultraviolet, and exhibited a blue color with the tetrazolium reagent and an orange color with 2, 4-dinitrophenylhydrazine. The material was eluted, and known amounts, estimated by ultraviolet absorption at 240 mμ, bioassayed for sodium retention in parallel with desoxycorticosterone (DOC) standards. Two micrograms were found to be equivalent in sodium retention to 8 μg. of DOC, and 8 μ g., to 16 and 25 μg. The mean output of this aldosterone-like material, calculated as DOC equivalents per gram of adrenal tissue per hour, was 9 μ g. Inasmuch as bioassays indicated that aldosterone is approximately 30 times more active than DOC, this value would be 0.3 μ g. in terms of aldosterone equivalents per gram of tissue per hour. (Author)

PB 160 400 $1.10

Naval Medical Research Inst., Bethesda, Md.
SOME EVIDENCE OF NON-COMPETITIVE REVERSIBLE INHIBITION OF ACETYLCHOLINESTERASE, by S. L. Freiss. Vol. 14, p. 845-850. 2 Nov 56, 6p. 8 refs. Research rept. on Project MM 300 018.12.09.

DESCRIPTORS: *Acetylcholines, Enzymes, *Cholinesterase, *Reaction kinetics, Inhibition, Nerves, Muscles.

The compound cis-2-dimethylaminocyclohexanol (I) has unexpectedly been found to act as a mild in nitro inhibitor of the nerve enzyme acetylcholinesterase. This inhibition appears to be of a non-competitive, reversible type leading to an enzyme-inhibitor dissociation constant $K_I = 6.0 \pm 0.4 \times 10^{-5}$ (at 25.14°C., pH 7.4) that is essentially independent of the acetylcholine substrate concentration below the 4×10^{-3} M. level. This compound also exhibits an anticholinesterase action on a frog rectus abdominis preparation leading to a K_I evaluation for the tissue cholinesterase by the technique developed by Jenden. The discrepancy factor between K_I values obtained by enzyme kinetics and the frog rectus method for compound I is of the same magnitude as that previously found by Jenden for the powerful competitive inhibitor eserine. (Author)

TID-16117 $11.00

Purdue U., Lafayette, Ind.
ASSIMILATION OF CARBON DIOXIDE INTO AMINO ACIDS BY AUTOTROPHICALLY GROWING CULTURES OF HYDROGENOMONAS FACILIS, by Richard Ahlvers Faust. Doctoral thesis. Jan 58, 143p. 93 refs.

TID-16115 $13.50

Purdue U., Lafayette, Ind.
CERTAIN ASPECTS OF CARBON DIOXIDE ASSIMILATION BY AUTOTROPHICALLY GROWING CULTURES OF HYDROGENOMONAS FACILIS, by Gerald Orgel. Doctoral thesis. Jan 58, 174p. 173 refs.

TID-16082 $2.60

Purdue U., Lafayette, Ind.
MOLD METABOLISM, by Dr. Henry Koffler and Dr. H. R. Garner. Final rept. on Contract AT(11-1)-111. [1962] 13p.

Microbiology

PB 160 320 $1.60

Naval Medical Research Inst., Bethesda, Md.
THE COMPARATIVE MORPHOLOGICAL AND PHYSIOLOGICAL EFFECTS OF VARIOUS DRUGS ON THE SPOROGONOUS CYCLE OF PLASMODIUM GALLINACEUM IN AEDES AEGYPTI, by Levon A. Terzian. Vol. 12, p. 561-574. 8 Dec 54, 14p. 5 refs. Research rept. on Project NM 007 081.01.10.

DESCRIPTORS: *Parasitology, Mosquitoes, Protozoa, *Plasmodium, Spores, Morphology, Physiology, *Malaria, *Drugs, Sulfadiazine, Tetracyclines

Sulfadiazine, chlortetracycline and oxytetracycline, and chloroguanide, all inhibit the normal development of the malarial parasite Plasmodium gallinaceum when they are administered to the mosquito host Aedes aegypti. As a consequence of their activity in preventing development of some specific phase of the sporogonous cycle in the mosquito host, these compounds produce, in addition, characteristic degenerative changes in the parasite. This study describes in detail these comparative morphological changes as they occur in vivo, and demonstrates them in the photomicrographs which accompany the text.

PB 160 387 $1.60

Naval Medical Research Inst., Bethesda, Md.
SELECTION OF A MUTANT STRAIN OF RICKETTSIA PROWAZEKI RESISTANT TO p-AMINOBENZOIC ACID, by Emilio Weiss, Harry R. Dressler, and Earl C. Suitor, Jr. Vol. 14, p. 891-910. 20 Nov 56, 20p. 21 refs. Research rept. on Project NM 005 048.25.01.

DESCRIPTORS: Bacteria, *Rickettsia, Inhibition, Vitamins, *Aminobenzoic acids.

x-radiation. It is concluded that no adeuqate explanation for this phenomenon of increased tolerance to x-ray radiation is available at the present time. (Author)

PB 160 390 $1.60

Naval Medical Research Inst., Bethesda, Md.
THE SEQUENCE OF PATHOLOGIC CHANGES IN SWINE EXPOSED TO THE $LD_{100/30}$ OF TOTAL BODY SUPER-VOLTAGE X-RADIATION, by John L. Tullis. 24 Aug 51, 18p. 10 refs, Research rept. on Project NM 006 012.04.38.

DESCRIPTORS: *X-rays, *Radiation effects, Pathology, *Swine, *Tissues (Biology), Lymphatic system, Circulatory system, Bone marrow.

Eighteen 140-pound barrows five to seven months old were subjected to 600 r total body X-radiation administered 300 r to each lateral aspect of the animal at two meters target-skin distance from the 2000 KVP source. The swine were killed at intervals from 50 minutes to 164 hours (seven days) after irradiation and their tissues were studied grossly and histologically for morphologic X-ray-induced changes. Lymphoid cells in the several lymphoid organs of the body had undergone degenerative changes in the swine examined 50 minutes after irradiation. Immature erythroid elements in the marrow reacted early and progressed to almost complete depopulation with no evidence of regeneration in the seven-day observation period. Lesions in the small intestine were limited to early necrosis with rapid regeneration of the epithelium in the deep glands of the mucosa, depletion of the lymphocytes in the lamina propria and solitary nodules, and the congestion of blood vessels.

PB 160 396 $2.60

Naval Medical Research Inst., Bethesda, Md.
SKIN LESIONS, EPILATION AND NAIL PIGMENTATION IN MARSHALLESE AND AMERICANS ACCIDENTALLY CONTAMINATED WITH RADIOACTIVE FALLOUT, by Robert A. Conard, Nahum R. Shulman and others. Vol. 13, p. 423-450. 29 Aug 55, 29p. 39 refs. Research rept. on Project NM 006 012.04.82; AD-75 611.

DESCRIPTORS: *Radioactive fall-out, Contamination, *Radiation injuries, *Skin, *Hair, Blood, Pathology.

Many individuals in the higher exposure groups complained of burning and itching of the skin during the first 24 to 48 hours after exposure. Epilation and skin lesions were observed, beginning approximately two to three weeks after exposure, on skin areas contaminated with fallout. Bluish-brown pigmentation of the fingernails was also a common finding. The majority healed rapidly with nonspecific therapy. Residual pigment aberration consisting of hyperpigmentation and lack of repigmentation and mild atrophic changes were noted in some deeper healed lesions at six months and one year. Regrowth of hair, normal in color and texture, began about nine weeks post-exposure and was complete at six months. Biopsies of typical lesions at three to six weeks showed changes consistent with radiation damage with marked epidermal damage and much less severe dermal damage. Biopsies at six months showed only a few residual changes. The nail discoloration had "grown out" completely at six months in all but a few individuals.

TID-16010 $1.10

Nebraska U., Lincoln.
THE EFFECTS OF BRAIN IRRADIATION, FEMUR IRRADIATION, AND STARVATION ON MAZE LEARNING IN RATS, by William J. Arnold and James B. Cho. Rept. on Contract AT(11-1)-249. [1962] 3p. 8 refs.

TID-15635 $3.60

Tennessee U., Knoxville.
TRANSFER OF ULTRAVIOLET RADIATION RESISTANCE IN MATING STRAINS OF ESCHERICHIA COLI, by James C. Copeland. Master's thesis. Dec 61, 35p. 37 refs.

Zoology

PB 160 393 $1.60

Naval Medical Research Inst., Bethesda, Md.
SEROLOGIC REACTIONS IN SCHISTOSOMA MANSONI INFECTIONS. I. CERCARICIDAL, PRECIPITATION, AGGLUTINATION, AND CHR PHENOMENA, by M. A. Stirewalt, and A. S. Evans. Vol. 13, p. 113-128. 5 Feb 55, 17p. 15 refs. Research rept. on Project NM 005 048.02.32,

DESCRIPTORS: *Parasitic infections, *Parisitology, Trematodes, *Schistosoma, *Serum, Precipitation, Hemagglutinins.

Cercariae of Schistosoma mansoni were observed in sera from uninfected hamsters, mice, rats, rabbits and guinea pigs, and from S. mansoni-infected hamsters, mice and rats. Strong cercaricidal activity, usually accompanied by the appearance of a granular or globular precipitate, was noted in all sera from rats, rabbits and guinea pigs, but not in mouse and hamster sera. These manifestations did not appear to be related to schistosome infection. All the infected sera were CHR positive, cercaricidal sera, however, only after heat-inactivation of the cercaricidal activity. Agglutination has been related to stickiness either of orally secreted material or of slowly developing membranes. The CHR or pericercarial membrane formation was an acquired reaction to the presence of either sex of living worms or schistosomula in the mice, rats and hamsters studied. It was found only around living cercariae. Cercarial exhaustion with respect to the CHR was demonstrated, but serum exhaustion was not. Possible diagnostic value of the CHR in unisexual and nonpatent infections is suggested. (Author)

PB 160 391 $1.10

Naval Medical Research Inst., Bethesda, Md.
SEROLOGIC REACTIONS IN SCHISTOSOMA MANSONI INFECTIONS. II. CERCARIAL BEHAVIOR IN ELECTROPHORETICALLY SEPARATED FRACTIONS OF SERA OF INFECTED AND UNINFECTED MICE, by

PB 160 394 $1.10

Naval Medical Research Inst., Bethesda, Md.
THE SCHWARTZMAN PHENOMENON. III. MODIFICATIONS OF NITROGEN-MUSTARD SUPPRESSION, by Henry A. Schlang. Vol. 10, p. 433-440. 26 Aug 52, 9p. 4 refs. Research rept. on Project NM 000 018.05.03.

DESCRIPTORS: Chemical warfare agents, *Nitrogen mustards, *Cysteine, *Leukopenia, Inflammation, *Mustard gas.

Studies on the effect of cysteine and inflammation on the leucopenia induced in the rabbit by nitrogen mustard, indicate that both agents tend to reduce or eliminate the leucopenia. With the decreased leucopenic effect of the mustard in animals treated with cysteine or inflammatory agents, is a decrease in the suppressive action of nitrogen mustard on the Shwartzman phenomenon. (Author)

AD-281 743 $0.50

Utah U. Coll. of Medicine, Salt Lake City.
THE INFLUENCE OF LOW AMBIENT TEMPERATURE ON COLD-ACCLIMATIZED MICE CHALLENGED WITH EHRLICH ASCITES TUMOR CELLS, by Stanley Marcus, Fred Miya and others. Oct 61, 13p. 19 refs. AAL Technical rept. 61-38.

DESCRIPTORS: *Tumors, Body fluids, Cells (Biology), Viability, Mice, Body temperature, *Ascites, *Hypothermia, Temperature

Ehrlich ascites tumor cells were given to mice acclimatized to low ambient temperatures. The mice were maintained at low ambient temperatures following challenge. The tumor cells were given via the intraperitoneal or subcutaneous route. The viability of the tumor cells was not affected, and the acclimatized mice showed significant delays in the mortality curves compared to the control animals kept at room temperature; however, the final mortalities were similar in the acclimatized and room temperature-exposed mice at all challenge doses employed. (Author)

Radiobiology

PB 160 878 $3.60

Army Medical Research Lab., Fort Knox, Ky.
PULSED IRRADIATION TECHNIQUES (SINGLE-PULSED, MULTI-PULSED, ULTRA-PULSED) AS A NEW APPROACH TO RADIOBIOLOGICAL PROBLEMS, by A. T. Krebs. Rept. on Biological and Medical Aspects of Ionizing Radiation. 1 Sep 61, 31p. 50 refs. Rept. no. 502.

DESCRIPTORS: *Radiobiology, Radiation instruments, *Radiation effects, X-rays, *Fractionation, *Dose rate,

Experiments at different laboratories, including USAMRL, have demonstrated the existence of new effects in pulsed irradiation studies and have proven a previously made prediction by Michie and Krohn on the lower efficiency of single high intensity pulses in comparison to conventional application of the same total dose in constant dose - variable radiation time experiments. The application of pulse techniques in radiation chemistry has led to detailed information on radical formation, chain reactions, and life-time of the different intermediates. The available radiobiological information manifests the importance of pulse-techniques in the endeavor to get an insight into the basic mechanisms of the radiation-effect and to measure the life-time of radiation produced free radicals and intermediates. (Author)

NYO-2375 $1.10

Institute for Cancer Research, Philadelphia, Pa.
METABOLIC STUDIES ON ETHIONINE AND DERIVATIVES, by J. A. Stekol. Final rept. 1 Aug 53-31 July 58, on Contract AT(30-1)-1552. [1958] 6p. 7 refs.

PB 160 296 $1.60

Naval Medical Research Inst., Bethesda, Md.
HISTOLOGIC CHANGES IN THE INCISOR TEETH OF RATS SERIALLY SACRIFICED AFTER RECEIVING 1,500 r of 200 KV X-RAY IRRADIATION, by Louis D. Hansen and James A. English. Vol. 14, p. 31-44. 19 Jan 56, 14p. 7 refs. Research rept. on Project NM 006 012.04.99.

DESCRIPTORS: *X-rays, *Radiation effects, Rats, *Teeth, Cells (Biology), *Histology.

Fifty white rats were irradiated locally to the head with 1,500 r of 200 kv x-ray. These rats were serially sacrificed simultaneously with 50 littermate control rats at various intervals beginning at 16 hr following exposure. Examination of histologic sections of teeth revealed that the locus of radiation injury was principally within the young, metabolically active, functioning odontogenic layers of cells. It appeared that, even though this damaged tissue underwent severe retrogressive changes, the irradiation was not sufficient to destroy either the undifferentiated epithelial and mesenchymal cells, or those odontogenic cells that had completed their physiologic function. A second tooth was observed to arise from these surviving undifferentiated cells of the tooth germ. The reason there were two separate segments of tooth arising from a single tooth germ was because of a severe interruption in tooth formation following radiation, and during the early recovery period abnormal tooth substance was formed. Finally relatively normal tooth structure was again formed by the odontogenic cells. (Author)

PB 160 343 $1.10

Naval Medical Research Inst., Bethesda, Md.
THE INCREASED TOLERANCE OF MICE TO A LETHAL DOSE OF X-RAY RADIATION AS A RESULT OF PREVIOUS SUBLETHAL EXPOSURES, by Eugene P. Cronkite, Clyde R. Sipe and others. Rept. no. 15 on Project NM 007 039. 17 Aug 48, 7p. 17 refs.

DESCRIPTORS: *Radiation tolerance, *X-rays, *Dosage, Radiation effects, Radiation injuries

It has been demonstrated with a fair degree of certainty ($0.05 > P_{diff} > 0.02$) that three weekly exposures of 144 r followed by a 30 day period increases the resistance of mice to a subsequent lethal dose of

DESCRIPTORS: *Iodine, Fats, Chloroform, *Colorimetric analysis, Titration

The optical density of solutions of Wijs' reagent in chloroform is proportional to the concentration of titratable iodine at a wave length of 400 mu. When known amounts of fat are added to this reagent, the change in optical density is proportional to the degree of halogenation. (Author)

ORNL-TM-255 $2.60

Oak Ridge National Lab., Tenn.
A PRODUCTION CONTROL METHOD FOR DETERMINING THE PARTICLE SIZE DISTRIBUTIONS OF THORIUM OXIDE AND THORIUM OXALATE, by L. C. Bate and G. W. Leddicotte. 15 June 62, 23p. 5 refs.

ORNL-TM-270 $1.60

Oak Ridge National Lab.; Tenn.
STRONTIUM, STRONTIUM-90, AND CALCIUM ANALYSES OF CLINCH AND TENNESSEE RIVER CLAMS, by D. J. Nelson. 20 June 62, 20p. 8 refs.

Organic Chemistry

AD-275 878 $8.10

Florida State U., Tallahassee.
[SOME EXPERIMENTS WITH ORGANOBORON COMPOUNDS] by J. E. Leffler, I. Forsblad and others. Final technical rept. on Contract Nonr-256000. 17 May 62, 83p. 44 refs.

DESCRIPTORS: *Metalorganic compounds, *Complex compounds, *Organoboranes, *Boron compounds, *Nitrogen compounds, Azo radicals, Phenyl radicals, Napthyl radicals, Fluorines, *Phosphenes, Benzenes, Sulfonyl radicals, Azides, Synthesis, Chemical reactions, Molecular spectroscopy, Ultraviolet spectroscopy, Photolysis, Decomposition

Contents:
Organoboron chemistry
The fluorenyl-nitrogen system
The chemistry of phosphine-azide complexes
The decomposition of a substituted benzazides and benzenesulfonazides
The decomposition of benzenesulfonylazides
The mutual acceleration of the decomposition of benzenesulfonyl azide and t-butyl hydroperoxide
Triphenylphosphine oxide peroxide
Trapping of dichlorocarbene by triphenylphosphine
Miscellaneous exploratory experiments

AD-282 034 $0.50

Naval Research Lab., Washington, D. C.
NEW PARTIALLY FLUORINATED COMPOUNDS, by J. G. O'Rear and P. J. Sniegoski. Interim rept. 18 July 62, 13p. 21 refs. NRL rept. 5795.

DESCRIPTORS: *Fluorination, *Fluorides, Organic compounds, *Esters, *Metallic soaps, *Carbamates, *Hydrocarbons, Thio radicals, *Ethers, Alcohols, Acids, Boiling, Melting, Density, Refractive index, Synthesis.

Twenty-seven new partially fluorinated compounds were synthesized specifically for study as surfactants, high dielectric fluids, and high-tempeature antioxidants. Preparative procedures for the various compounds are described. The compounds include twenty fluoroesters, two copper soaps, two dicarbamates, two partially fluorinated hydrocarbons, and one thioether. All compounds are derived from fluoroalcohols of the general formulas $F(CF_2)_nCH_2OH$ and $H(CF_2)_nCH_2OH$ or from the fluoroacid $H(CF_2)_{10}COOH$. Pertinent physical and chemical constants reported for the compounds include boiling point, melting point, density, refractive index, molecular refraction, and saponification equivalent. (Author)

Physical Chemistry

DC-61-6-13 $1.60

General Electric Co., Cincinnati, Ohio.
STUDIES IN THE $MgUO_3$-$MgUO_4$ SYSTEM, by R. M. Haag and C. R. Muncy. Preliminary rept. on Contract AT(11-1)-171. 5 June 61, 15p. 8 refs.

TID-16031 $1.10

Hughes Research Labs., Malibu, Calif.
STUDIES OF H_2^+ DISSOCIATION, by A. W. Ehler. Quarterly progress rept. no. 2, 15 Feb-15 May 62, on Contract AT(04-3)-362. 6 June 62, 6p.

TID-15479 $1.60

Massachusetts Inst. of Tech., Cambridge.
CATALYTIC POLAROGRAPHIC CURRENTS FOR THE REDUCTION OF VANADIUM(III) IN THE PRESENCE OF VANADIUM(IV), by John W. Olver and James W. Ross, Jr. Rept. on Contract AT(30-1)-905. 25 Apr 62, 13p.

NCSC-2663-5 $2.60

North Carolina State Coll., Raleigh
STUDY OF PHASE RELATIONSHIPS IN THE U-C-O SYSTEM, by R. F. Stoops and J. V. Hamme. Final rept. no. 2, on Contract AT(40-1)-2663. Sep 61, 27p. EURAEC-128.

NCSC-2663-1 $3.60

North Carolina State Coll., Raleigh.
STUDY OF PHASE RELATIONSHIPS IN THE U-C-O SYSTEM, by R. F. Stoops and P. K. Maitra. Progress rept. on Contract AT(40-1)-2663. Sep 60, 39p. 100 refs. EURAEC-74.

NCSC-2663-6 $1.60

North Carolina State Coll., Raleigh.
STUDY OF PHASE RELATIONSHIPS IN THE U-C-O SYSTEM, by Robert F. Stoops and John V. Hamme. Progress rept. on Contract AT(40-1)-2663. Dec 61, 14p. EURAEC-235.

A. S. Evans, Margaret Stirewalt Lincicome, and Maxime Mackenzie. Vol. 13, p. 451-458. 12 July 55, 8p. 11 refs. Research rept. on Project NM 005 048. 02. 33.

DESCRIPTORS: Parasitology, Trematodes, *Schistosoma, *Serum, Blood proteins, Electrophoresis, Mice, *Parasitic infections

Sera from mice with Schistosoma mansoni infections of long duration and from uninfected mice of similar age were separated by moving boundary electrophoresis and photographs were made using the Schlieren scanning method. Samples were withdrawn from the electrophoresis cells at increasing depths from the salt boundaries. Six components were present in uninfected mouse serum with mobilities similar to albumin, alpha$_1$, alpha$_2$, beta$_1$, beta$_2$ and gamma globulins. In infected mouse serum, albumin and alpha globulin areas were reduced and the beta area increased relative to uninfected mouse serum. The alpha$_1$ and alpha$_2$ peaks of uninfected mouse serum appeared as a single peak in infected. Cercarial behavior was observed in eight samples from the electrophoresis cells. Those samples which contained "gamma" globulin without "alpha" globulin were cercaricidal; those from infected mouse serum which contained both "gamma" and "alpha" were positive for pericercarial envelopes. Therefore it was concluded that the "gamma" sample from infected mouse serum contained both cercaricidal and pericercarial envelope forming (CHR) factors and that the "alpha" sample contained a cercaricidal inhibitor. (Author)

PB 160 392 $1.10

Naval Medical Research Inst., Bethesda, Md.
SEROLOGIC REACTIONS IN SCHISTOSOMA MANSONI INFECTIONS. III. IONOGRAPHIC FRACTIONATION OF SERA OF MICE WITH PROGRESSIVE DISEASE, by A. S. Evans and M. A. Stirewalt. Vol. 14, p. 581-588. 27 July 56, 9p. 9 refs. Research rept. on Project NM 005 048. 02. 35.

DESCRIPTORS: *Parasitic infections, Parasitology, Trematodes, *Schistosoma, *Serum, Blood proteins, Fractionation, Electrophoresis, Mice.

Serum protein response of Schistosoma mansoni-infected mice was compared with uninfected controls of the same age after 5, 12, 20 and 26 weeks duration of the disease. Total serum protein was determined by a micro-kjeldahl technique, and the serum was fractionated in a semiclosed, horizontal-bridge paper electrophoresis apparatus using 0.1 M veronal buffer, pH 8.6, at 2.7 or 3.1 volts/cm. for 26 or 24 hours respectively, at 5° to 8°C. The various components were identified by analogy with similarly separated human serum fractions and their movement relative to that of the mouse albumin peak. In the early disease, before deposition of eggs in the liver and migration of the worms to the mesenteric vessels, no notable changes in the serum protein fractions were observed. However, with progressive disease, an increase in total protein referable by ionographic determination directly to an absolute increase in the gamma-beta globulin regions was encountered. The absolute concentration of albumin remained constant within biological limits, resulting in decreased albumin-globulin ratios. The previously reported disappearance of the aplha1 fraction in old schistosome infections appeared to be, at least in part, gerontic. (Author)

CHEMISTRY

Order from GPO $0.05 as I 28.37/a:H367/961

Bureau of Mines, Washington, D. C.
HELIUM, by Harold W. Lipper. 1961, 6p. 6 refs.

Preprint from Minerals Yearbook, 1961, v. 2.

DESCRIPTORS: Gases, *Helium, Production, Consumption, Industrial research.

Helium production and shipment reached new peaks in 1961. The Bureau of Mines produced 727 million cubic feet, 13 percent more than the 1960 record, and shipped 552 million cubic feet, 16 percent more than the 1960 record. Contracts to implement a long-range helium conservation program were completed with four companies, obligating all the contracting authority of $47.5 million a year made available by the Congress. The four companies will finance, build, and operate helium extraction plants to recover from natural gas an annual average of 3.1 billion cubic feet of helium that would ordinarily be wasted when the helium-bearing natural gas is used for fuel. A Helium Research Center was established at Amarillo, Tex., as an integral part of the helium conservation program. Research will include studies of the properties and uses of helium so that the conserved helium may be used wisely and effectively. Seven articles were published describing work at the center.

ORNL-TM-260 $1.60

Oak Ridge National Lab., Tenn.
HEAD-END TREATMENT OF LOW LEVEL WASTES PRIOR TO FOAM SEPARATION, by Ernest Schonfeld and W. Davis, Jr. 29 May 62, 11p. 4 refs.

Analytical Chemistry

DC-61-6-5 $1.10

General Electric Co., Cincinnati, Ohio.
TEMPERATURE DEPENDENCE OF FISSION PRODUCT RETENTION ON A METALLIC SURFACE, by J. J. Mueller. Preliminary rept. on Contract AT(11-1)-171. 26 May 61, 15p. 3 refs.

TID-16097 $3.60

Michigan U., Ann Arbor.
LEWIS ACID-BASE TITRATION EMPLOYING MEGACYCLE-FREQUENCY OSCILLATORS. I. INTRODUCTION. TITRATION INVOLVING ALUMINUM CHLORIDE IN ACETONITRILE SOLUTION, by Eldon T. Hitchcock and Philip J. Elving. Rept. no. 69 on Contract AT(11-1)-1148. 20 June 62, 35p. 54 refs.

PB 160 317 $1.10

Naval Medical Research Inst., Bethesda, Md.
A COLORIMETRIC METHOD FOR THE DETERMINATION OF IODINE NUMBERS, by Richard H. Weaver and Gordon Fish. Rept. no. 2 on Project NM 007 030. 7 July 47, 9p. 5 refs.

TEI-818 $8.10

Geological Survey, Washington, D. C.
GROUND WATER TEST WELL C, NEVADA TEST SITE, NYE COUNTY, NEVADA, by M. S. Garber and William Thordarson. 1962, 90p.

TEI-814 $3.60

Geological Survey, Washington, D. C.
INTERIM GEOLOGICAL INVESTIGATIONS IN THE U12b.08 TUNNEL, NEVADA TEST SITE, NYE COUNTY, NEVADA, by W. L. Emerick and F. N. Houser. Mar 62, 31p.

Order from GPO $0.30 as
I 19.16:418-A

Geological Survey, Washington, D. C.
LATE BAJOCIAN AMMONITES FROM THE COOK INLET REGION ALASKA. JURASSIC AMMONITES FROM SOUTHERN ALASKA, by Ralph W. Imlay. Rept. on Jurassic Ammonites from Southern Alaska. 1962. 27p. 22 refs. Geological Survey Professional Paper 418-A.

DESCRIPTORS: *Mollusca, Age, Distribution, Classification, *Paleoecology, Alaska.

Description and illustrations of cephalopods of Middle Jurassic (late Bajocian) age.

TEI-817 $4.60

Geological Survey, Washington, D. C.
OUTLINE OF GEOLOGY OF THE U12K AND U12K.01 TUNNELS, AREA 12, NEVADA TEST SITE, by Fred N. Houser. 1962, 57p.

TEI-811 $6.60

Geological Survey, Washington, D. C.
POROSITY, DENSITY, AND WATER CONTENT DATA ON TUFF OF THE OAK SPRING FORMATION FROM THE U12e TUNNEL SYSTEM, NEVADA TEST SITE, NYE COUNTY, NEVADA, by F. M. Byers, Jr. Dec 61, 77p.

Order from GPO $0.50 as
I 19.13:1619-I

Geological Survey, Washington, D. C.
PUMPING TESTS IN THE LOS ALAMOS CANYON WELL FIELD NEAR LOS ALAMOS, NEW MEXICO, CONTRIBUTIONS TO THE HYDROLOGY OF THE UNITED STATES, by C. V. Theis and C. S. Conover. 1962, 24p. 5 refs. Geological Survey Water-Supply paper 1619-I.

DESCRIPTORS: *Hydrology, Geological survey, *Water supplies, *Petroleum, Sources, Pumps, Tests, *New Mexico

Order from GPO $1.00 as
I 19.3:1107-E

Geological Survey, Washington, D. C.
URANIUM AND OTHER TRACE ELEMENTS IN DEVONIAN AND MISSISSIPPIAN BLACK SHALES IN THE CENTRAL MIDCONTINENT AREA. CONTRIBUTIONS TO THE GEOLOGY OF URANIUM, by E. R. Landis. 1962, 47p. 39 refs. Geological Survey bulletin 1107-E.

DESCRIPTORS: *Geology, Geological survey, *Shales, Radioactivity, *Uranium, *Labeled substances, Sources.

Order from GPO $0.65 as
I 19.3:1107-D

Geological Survey, Washington, D. C.
URANIUM OCCURRENCES IN SEDIMENTARY ROCKS OF PENNSYLVANIA. CONTRIBUTIONS TO THE GEOLOGY OF URANIUM, by Harry Klemic. 1962, 45p. 39 refs. Geological Survey bulletin 1107-D

DESCRIPTORS: *Geology, Geological survey, *Uranium, Sources, Rock, Sedimentation, *Pennsylvania.

Physics of the Atmosphere

PB 150 670 $6.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
IONOSPHERIC STUDIES FROM AN ANALYSIS OF SATELLITE RADIO SIGNALS WITH AN AUTOMATIC TRACKING FILTER, by D. S. Anderson. Scientific rept. no. 138 on Ionospheric Research, Contract AF 33(616)6157. 1 Sep 60, 65p. 14 refs. AD-242 574.

DESCRIPTORS: *Ionosphere, *Satellite vehicle research, Radio signals, Instrumentation, Analysis, Electrons, Doppler tracking, Doppler systems, *Radiofrequency filters, Automatic.

A brief survey is made of the methods used for ionospheric investigation. This includes a simple illustration of the theory of the dispersive doppler experiment utilizing radio transmissions from earth satellites. Detailed descriptions of the equipment used to measure the dispersive doppler frequency are given. In particular, an automatic tracking filter which was especially designed for this study is discussed. A preliminary study was made of data obtained utilizing this equipment. The primary data consists of total electron content, from which a thickness parameter was derived. The factors which influence this parameter were investigated and the results are reported. (Author)

NCSC-2663-3 $1.60

North Carolina State Coll. Raleigh.
STUDY OF PHASE RELATIONSHIPS IN THE U-C-O-SYSTEM, by R. F. Stoops and J. V. Hamme. Quarterly rept. no. 2, Jan-Mar 61, on Contract AT(40-1)-2663. 31 Mar 61, 15p. EURAEC-73.

NCSC-2663-4 $1.60

North Carolina State Coll., Raleigh.
STUDY OF PHASE RELATIONSHIPS IN THE U-C-O SYSTEM, by R. F. Stoops and J. V. Hamme. Quarterly rept. no. 3, Apr-June 61, on Contract AT(40-1)-2663. June 61, 18p. 3 refs. EURAEC-127.

ORNL-TM-184 $1.60

Oak Ridge National Lab., Tenn.
SOLVENT EXTRACTION SEPARATION OF NEODYMIUM AND PROMETHIUM USING DI (2-ETHYLHEXYL)ORTHOPHOSPHORIC ACID AS EXTRACTANT, by Baldomero Lopez Perez and R. E. McHenry. 6 July 62, 12p. 6 refs.

EARTH SCIENCES

PB 160 874 $5.60

Quartermaster Research and [Engineering Command] Natick, Mass.
ENVIRONMENT OF SOUTHEAST ASIA, by Selva C. Wiley, William C. Robison and others. Aug 53, declassified, 51p. Environmental Protection Div. rept. no. 219.

DESCRIPTORS: *Asia, *Laos, *Thailand, Population, *Transportation, Harbors, Railroads, Roads, Airports, *Terrain, Mountains, Inland waterways, *Climate, Wind, Precipitation, *Plants, Agriculture, *Public health, Diseases, Storage.

Southeast Adia comprises some 800,000 square miles in the countries of Burma, Thailand, Laos, Cambodia, Vietnam, and Malaya. With the exception of Thailand, these countries are all in the process of emerging from recent colonial status. Nearly all the region lies between the Equator and the Tropic of Cancer, and its situation between India and communist China makes it a place of great strategic importance. A large part of the region is mountainous with steep slopes and narrow valleys. Southeast Asia has a tropical climate with heavy rains and high temperatures and humidities. Deterioration of equipment and supplies constitutes a special problem of protection. The chief means of transportation is by boat, both along the coasts and on the extensive river and canal systems. The most serious health problem in the region is presented by malaria, but other insect-born diseases also are prevalent. Sanitation is required as a safeguard against intestinal and other diseases, with special care required in regard to water and food supplies.

Geology

Order from GPO $2.00 as
I 19.16:348

Geological Survey, Washington, D. C.
CARBONIFEROUS FORMATIONS AND FAUNAS OF CENTRAL MONTANA, by W. H. Easton. 1962, 40p. 203 refs. Geological Professional Paper 348.

DESCRIPTORS: *Paleoecology, Montana, Animals, *Protozoa, *Sponges, Coral reefs, *Echinoderms, *Worms, *Mollusca, *Arthropods, Classification, Distribution.

A study of the stratigraphic and ecologic associations and significance of fossils from the Big Snowy group of Mississippian and Pennsylvanian rocks.

TEI-805 $14.50

Geological Survey, Washington, D. C.
GEOLOGY AND GROUND WATER HYDROLOGY OF THE ATLANTIC AND GULF COASTAL PLAIN AS RELATED TO DISPOSAL OF RADIOACTIVE WASTES, by Harry E. LeGrand. Jan 62, 218p. 131 refs.

Order from GPO $1.25 as
I 19.3:1142-F

Geological Survey, Washington, D. C.
GEOLOGY OF THE MAGNESITE BELT OF STEVENS COUNTY, WASHINGTON. CONTRIBUTIONS TO ECONOMIC GEOLOGY, by Ian Campbell and John S. Loofbourow, Jr. 1962, 53p. 62 refs. Geological Survey bulletin 1142-F.

DESCRIPTORS: *Geology, Geological survey, Economics, *Magnesite, *Washington.

Geologic setting and brief description of the magnesite deposits.

Order from GPO $0.60 as
I 19.3:1031-D

Geological Survey, Washington, D. C.
GEOLOGY OF WATERPOWER SITES ON CRATER LAKE, LONG LAKE AND SPEEL RIVER NEAR JUNEAU, ALASKA. GEOLOGY OF WATERPOWER SITES IN ALASKA, by John Charles Miller. 1962, 101p. 6 refs. Geological Survey bulletin 1031-D.

DESCRIPTORS: *Geology, Geological survey, *Lakes, *Inland waterways, *Dams, Feasibility studies, *Alaska.

A preliminary examination of the geologic feasibility of proposed damsites.

TEI-808 $4.60

Geological Survey, Washington, D. C.
GROUND WATER TEST WELL B, NEVADA TEST SITE, NYE COUNTY, NEVADA, by John E. Moore and Murray S. Garber. Apr 62, 47p. 7 refs.

in a qualification program was investigated from statistical, economic, and availability viewpoints. A compromise approach to the selection of the number of samples is presented. (Author)

AD-282 207 $1.50

Directorate of Engineering Test, Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
FLIGHT VIBRATION SURVEY OF F-106A AIRCRAFT, by H. Kent Reich. Final rept. May 62, 51p. ASD TDR-62-504.

DESCRIPTORS: *Jet fighters, *Jet planes, *Vibration, *Flight testing, Instrumentation, *Aircraft equipment, Electronic equipment, Computers, *Vibration isolators.

An F-106A aircraft, SN 53-466, was surveyed to determine the vibration environment existing throughout the vehicle under all flight conditions expected in service. Approximately 18,890 data points were obtained from 25 separate locations on the vehicle during 23 test flights. The data obtained in this survey were evaluated to determine the adequacy of vibration test requirements for aircraft equipment as contained in Specification No. Mil-E-5272C. The data indicated that the vibration testing requirements of the specification are more than adequate, a finding substantiated by all previous (vibration) surveys performed on Century Series aircraft. (Author)

PB 181 324 $7.00

Lockheed Missile and Space Co., Sunnyvale, Calif.
STRENGTH, EFFICIENCY, AND DESIGN DATA FOR BERYLLIUM STRUCTURES, by Robert F. Crawford and A. Bruce Burns. Rept. for Feb 60-Dec 61, on Design Technologies and Structural Configuration Concepts for Aerospace Vehicles, Contract AF 33(616)6905. Feb 62, 516p. 58 refs. Rept. no. 2-47-61-3; ASD Technical rept. 61-692.

DESCRIPTORS: *Beryllium, Structures, Design, Mechanical properties, Physical properties, Sandwich panels, Sandwich construction, Sheets, Beams, *Airframes, *Airplane panels, Mathematical analysis, Load distribution, Stresses, Pressure.

The purpose of this study program was to investigate the design capabilities of beryllium as a structural material and to derive and develop structural design curves and related data for efficient structural design with beryllium. The metal beryllium is believed to have high potential for aerospace structures, but is not extensively considered in design applications at the present time because of uncertainties as to the proper design procedures. This report presents information based on studies and tests which clearly shows that beryllium now may be designed with confidence into many types of load-carrying structures, using well-known methods of structural analysis and appropriate margins of safety. The resulting beryllium structures are shown to be considerably lighter than identical structures fabricated from other metals, and these structures are attainable with currently available beryllium mill products. (Author)

PB 160 764 $11.00

National Aviation Facilities Experimental Center, Atlantic City, N. J.
DYNAMIC SIMULATION STUDY AND EVALUATION OF A PROPOSED AIR TRAFFIC PROCEDURAL PLAN AND CONTROL EQUIPMENT CONFIGURATION FOR THE WASHINGTON, D. C. AREA, by D. Bottomley, R. E. Hansen and others. Final rept. Mar 62, 148p. Proj. no. 101-112V.

DESCRIPTORS: Air traffic, Control, *Airport control towers, *Air traffic control systems, Simulation, *Control simulators, Tests, Configuration, *District of Columbia.

The purpose of this project was to conduct a simulation study and evaluation of a proposed procedural plan for the operation and control of instrument flight rule (IFR) air traffic in the Washington D. C. area. An optimum procedural plan was developed by simulation and modification of the proposed plan; this plan was then tested with three different IFR control-room equipment configurations. The first of the equipment tests utilized a terminal area IFR room configuration proposed for location in Hangar 6 at Washington National Airport in the space presently occupied by the Air Route Traffic Control Center. Two other configurations were tested which integrated terminal control with en route control, one an "In-Line" and the other a "Butterfly" equipment arrangement. The two integrated configurations were proposed for installation in the new Center building at Leesburg, Va. The modified procedural plan functioned properly with the traffic density simulated under all three equipment configurations, with approximately the same number of aircraft movements. Overall coordination was easier and controller workload was less under the "Butterfly" configuration. Separate tests were made of Andrews Air Force Base IFR and VFR traffic with increased density. No difficulties were encountered in the tests. En route tests were conducted to determine what problems existed in that area, but none was apparent. (Author)

PB 160 766 $8.10

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF AN APPLICATION OF THE CENTRAL FACILITY CONCEPT IN THE SAN FRANCISCO BAY AREA, by R. Cassell, R. Conway and others. Final rept. June 62, 90p. Proj. no. 101-111V.

DESCRIPTORS: Air traffic, Control, *Airport control towers, *Air traffic control systems, Simulation, *Control simulators, Feasibility studies, *San Francisco Bay.

The model B dynamic air traffic control simulator was used in testing the application of a central facility (common IFR room) concept to the San Francisco Bay Area. Equipment configurations and control procedures were developed for use during the tests. The simulation studies were divided into three phases for comparative purposes. These were tests of (1) the present system, (2) a modified system proposed as an interim step, and (3) a central facility system of approach control. (Author)

PB 151 373 $0.50

National Bureau of Standards, Boulder, Colo.
ANALYSIS OF IONOSPHERIC VERTICAL SOUNDINGS FOR ELECTRON DENSITY PROFILE DATA. I. FACILITIES FOR CONVENIENT MANUAL REDUCTION OF IONOGRAMS, by J. W. Wright and R. B. Norton. July 59, 13p. 4 refs. Technical note no. 14.

DESCRIPTORS: *Electrons, Density, Determination, *Ionosphere, *Atmospheric sounding, Data, Analysis.

Facilities for manual reduction of ionospheric vertical soundings to true heights are prepared using the "10 point" ratios of Ventrice and Schmerling. A study of the effects of the earth's magnetic field on true height calculations permits selection of five sets of these ratios assuring equal accuracy of application for any part of the world. The facilities available are in the form of transparent overlays and matching special graph paper. (Author)

PB 151 378 $0.50

National Bureau of Standards, Boulder, Colo.
ANALYSIS OF IONOSPHERIC VERTICAL SOUNDINGS FOR ELECTRON DENSITY PROFILE DATA. II. EXTRAPOLATION OF OBSERVED ELECTRON DENSITY PROFILES ABOVE $h_{max}F2$, by J. W. Wright. June 59, 8p. 1 ref. Technical note no. 19.

DESCRIPTORS: *Electrons, Density, Determination, *Ionosphere, *Atmospheric sounding, Data, Analysis.

A tentative model of the F region above h_{max} is provided to permit extrapolation of electron density profiles into this region. The model corresponds to a simple "Chapman" curve, and may be fitted to true height data (obtained in part I) by a simple graphical process. (Author) (See also PB 151 373)

ENGINEERING

NYO-9851 $2.60

Consolidation Coal Co., Library, Pa.
UTILIZATION OF RADIOACTIVE ISOTOPES IN COAL PROCESS RESEARCH, by P. M. Yavorsky, E. Gorin, and J. L. Freeman. Quarterly technical status rept., no. 12, 1 Mar-31 May 62, on Contract AT(30-1)-2350. 1 July 62, 23p. 11 refs.

CF-57-2-1(Rev. 1) $2.60

Oak Ridge National Lab., Tenn.
SYMBOLS FOR INSTRUMENT FLOWSHEETS AND DRAWINGS: A RECOMMENDED SYSTEM FOR APPLICATION TO ORNL INSTRUMENT WORK, by R. K. Adams, D. G. Davis, and others. 19 June 62, 31p.

Aeronautical Engineering

AD-282 003 $3.00

Aeronca Mfg. Corp., Middleton, Ohio.
BERYLLIUM COMPOSITE STRUCTURES. VOLUME I: DESIGN AND APPLICATION, by J. N. Krusos, A. S. Kjelby and others. Final technical engineering rept. 4 Feb 60-31 Aug 61, on Design Technologies and Structural Configuration Concepts for Aerospace Vehicles, Contract AF 33(616)7050. May 62, 179p. 38 refs. Rept. no. ER-532; ASD-TR-61-706, Volume I.

DESCRIPTORS: *Beryllium, Sheets, Mechanical properties, Sandwich panels, *Re-entry vehicles, *Aluminum compounds, Oxides, Dioxides, *Silicon compounds, *Zirconium compounds, Exhaust systems, Turbojet engines, Ramjet engines, Ceramic materials, Insulating materials, Thermal insulation, Design, Foams, Sandwich construction, Manufacturing methods, Thermodynamics, Structural shells, Thermal stresses, *Surface temperatures, *Aerodynamic heating, Stresses, Mathematical analysis

Design information is presented for beryllium and ceramic composite structures for re-entry vehicle applications. The volume includes a summary of materials and process developments for beryllium panels and heat shield ceramics, analytical evaluations, and discussion of application of insulated structural concepts to re-entry vehicle systems. Also included are the results of panel tests in the severe environments of turbojet and ramjet exhausts. Data suitable for preliminary design considerations are presented for three reinforced heat shield ceramic foams: alumina, silica, and zirconia. Beryllium sandwich panels constructed in the course of the program are described with regard to fabrication potential and performance in aerospace structures. (Author)

PB 160 823 $7.60

American Power Jet Co., Ridgefield, N. J.
ENVIRONMENTAL TEST SEQUENCING AND NUMBER OF TEST ITEMS, by Robert W. Jailer. Rept. on Contract AF 33(616)5412. July 59, 78p. 47 refs. WADC-TR-59-490; AD-231 293.

DESCRIPTORS: *Aircraft equipment, *Air force equipment, Tests, Exposure, Climatic factors, Stresses, *Maintenance equipment, Statistical analysis, Test methods

A series of thirteen test sequences for environmental qualification testing of USAF equipment are presented. These are based on a classification of all USAF equipment into thirteen more or less homogeneous groups from an environmental testing viewpoint. Rules for assigning equipment items to classes are included. The sequences were established from data on the reaction of the various classes of equipment to the tests in MIL-E-005272B and MIL-E-4970, obtained from a literature survey and a field interview program covering industrial, commercial and government environmental testing laboratories. The sequences are presented as suggested starting points for the development of qualification test programs, rather than hard-and-fast rules. An Environmental Test Sequence Slide Rule has been developed to present the sequencing information in easily usable form. The number of samples to be tested

PB 160 762 $4.60

American Potash and Chemical Corp., Los Angeles, Calif.
STATUS OF RESEARCH ON THE LARGE SCALE PRODUCTION OF ELEMENTAL BORON, by Harold Mazza and Glen H. Schafer. Quarterly technical progress rept. no. 3, 1 Sep-1 Dec 53, on Contract AF 33(616)488. 19 Dec 53, declassified 7 May 57. 50p. AD-23 480.

DESCRIPTORS: *Boron, Production, *Boron compounds, Oxides, Reduction.

Further studies on the production of amorphous B by the magnesiothermic reduction of B_2O_3 disclosed a system for the recovery of H_3BO_3 from the spent acid-leach liquor. The system consisted of neutralizing the residual HCl with $Na_2B_4O_7$ and recovering the H_3BO_3 by concentrating and cooling the resultant liquor. The recovered H_3BO_3 would be sufficiently pure to permit dehydration to B_2O_3, which in turn would be used for producing additional B. High Mg-bearing B containing few O-bearing impurities was produced for calorific evaluation tests. Unsuccessful attempts were made to produce an acceptable grade of crude B in single charges containing 1095 lb of the reactant mixture. The purity of the B product appeared to be related to the size and shape of the charge. (See also PB 160 761)

PB 160 763 $5.60

American Potash and Chemical Corp., Los Angeles, Calif.
STATUS OF RESEARCH ON THE LARGE SCALE PRODUCTION OF ELEMENTAL BORON, by Harold Mazza and Dwight L. Sawyer. Quarterly technical progress rept. no. 4, 1 Dec 53-1 Mar 54, on Contract AF 33(616)488. 15 Mar 54, declassified 7 May 57. 57p. AD-28 721.

DESCRIPTORS: *Boron, Production, *Boron compounds, Oxides, Reduction, Industrial production, Costs.

A preliminary materials balance, flow sheet, and cost data are presented for a plant capable of producing 10,000 lb of elemental B per month. The process consisted of reducing the B_2O_3 magnesiothermically under an NH_3 atmosphere and leaching the crude B in excess acid. The slurry was neutralized with $Na_2B_4O_7$, and the solids were separated by filtration. Additional impurities were removed by froth flotation. The B produced was separated and vacuum dried. The filtrate from acid digestion was concentrated and cooled for the recovery of H_3BO_3, which was dehydrated to B_2O_3 for recycling. The theoretical efficiency of the process is 54.6% based upon B and 78.6% based on Mg. Retreatment of B plant tailings; the H_3BO_3 acid recovery step; corrosion studies; the material balance for a 2.65 ratio, massive charge; and further attempts to increase the purity of the B product are discussed. (See also PB 160 762)

PB 160 767 $6.60

American Potash and Chemical Corp., Los Angeles, Calif.
STATUS OF RESEARCH ON THE LARGE SCALE PRODUCTION OF ELEMENTAL BORON, by Harold Mazza and Dwight L. Sawyer. Quarterly technical progress rept. no. 5, 1 Mar-1 June 54, on Contract AF 33(616)488. [1954] declassified 7 May 57, 61p. AD-34 713.

DESCRIPTORS: *Boron, Production, *Boron compounds, Oxides, Reduction.

In producing crude B by igniting a mixture of B_2O_3 and Mg, Variations in reactants ratio and charge size had a significant influence upon the final product purity, particle size, and chemical reactivity. The chemical reactivity of B can be increased by reducing the charge size and/or configuration. With a 2.65 to 1.00 ratio of B_2O_3 to Mg, a 3-in. -diam charge resulted in the production of B containing 0.32% H_2O_2 insolubles, while 12-in. charge material contained 12.5%. This is in contrast to pilot plant B (21-in. charge) which contains 15.3% H_2O_2 insolubles. The variations in H_2O_2 insoluble contents are attributed to the sintering of B particles at the higher thermal levels reached in the larger charges. High Mg-bearing B containing 87% B and 11% Mg was upgraded by leaching with 40 times its weight of molten B_2O_3 to yield a 95% material containing 2.2% Mg. B produced in the pilot plant was also increased in purity by use of a molten LiCl-KCl eutectic leach; a 91.0% B containing 2.5% Mg was upgraded to a 92.8% product containing 0.4% Mg. (See also PB 160 763)

PB 160 768 $5.60

American Potash and Chemical Corp., Los Angeles, Calif.
STATUS OF RESEARCH ON THE LARGE SCALE PRODUCTION OF ELEMENTAL BORON, by Harold Mazza, Dwight L. Sawyer, and Rodger W. Baier. Quarterly technical progress rept. no. 6, 1 June-1 Sep 54, on Contract AF 33(616)488. 1 Oct 54, declassified 7 May 57. 59p. 2 refs. AD-46 875.

DESCRIPTORS: *Boron, Production, Boron compounds, Oxides, Reduction, Magnesium, Chemical reactions, Chemical impurities.

A B product was produced which contained 2% or less H_2O_2 insolubles; a shallow tray-type H_2O-cooled crude B reactor was utilized. A 5-lb lot of B having a content and 0.9-μ particle size was produced by reacting a 3.35 to 1 ratio of B_2O_3 to Mg. A refined, 95% grade B was produced by leaching 11% Mg-87% B with 10 times its weight of B_2O_3 at 800°C for 2 hr. The cooled melt was given H_2O and aqueous HCl leaches. The solids were removed by filtration and vacuum dried. A high-Mg-bearing B was produced by reacting a 1.5 to 1 B_2O_3 to Mg mixture. A sample with the approximate composition of B_7O which gave a sharp x-ray diffraction pattern was not changed appreciably by high vacuum treatment at 1500°C for 5 min.

PB 160 765 $5.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
FIRE-HAZARD INVESTIGATION OF SUPERSONIC TURBOJET AIRCRAFT POWERPLANT COOLING AIR CONFIGURATIONS, by Ralph J. Slavik. Final rept. Jan 61, 53p. Task no. 59-201.15.

DESCRIPTORS: *Turbojet engines, *Aircraft fires, *Supersonic planes, Hazards, Gas flow, Ignition, Cooling, *Fires, Explosions.

A Northrop F-89 airplane turbojet powerplant was modified and mounted in a test cell so that tests could be conducted to determine the presence and character of fire and explosion hazards. The modification included removal of firewalls normally used in separating engine compartments, to simulate a supersonic configuration. Tests were made under various conditions of secondary airflow and turbine speeds with a flammable mixture present in the cooling airstream. Tests included fore-to-aft, reverse, and intermediate secondary airflows. During each of these conditions, various flammable fluids, release locations, release rates, secondary airflow rates, and engine speed combinations were experimented with so that fire characteristics, fuel and fire ingestion, as well as spark and hot-surface ignition phenomenon, could be observed. (Author)

AD-264 791 $17.00

Republic Aviation Corp., Farmingdale, N. Y.
HIGH TEMPERATURE (900° AND 1200° F) HARDWARE QUALIFICATION INVESTIGATION, by Elbert L. Wilcox. Rept. on Contract AF 33(616)6066, continuation of Contract AF 33(600)6034. June 61, 268p. WADD Technical rept. 60-383; AD-264 791.

DESCRIPTORS: *Aircraft equipment, Physical properties, Mechanical properties, Fatigue (Mechanics), Stresses, Bolts, Nuts (Mechanics), Self-locking nuts, Joints, Clamps, *High temperature research, Heat resistant alloys, Nickel alloys, Iron alloys, Corrosion resistant alloys, Titanium, plastics, Heat treatment.

Qualification test results for proposed 900° and 1200° F screw threaded AN-MS type hardware are presented including investigations of torsion-tension relationships and stress relaxation effects. The 1200° series made of U212 material is recommended for entire range. Proposed standard drawings and specifications have been compiled. Shear joint test results using titanium alloy plates and 100° reduced flush head bolts at 600° F are also presented. (Author)

PB 160 777 $1.10

Wright Air Development [Div.] Wright-Patterson AFB, Ohio.
ENVIRONMENTAL PROGRAM FOR PILOTLESS AIRCRAFT, by Robert K. Hankey. 2 Sep 55, 9p. WADC Technical note 55-498; AD-79 981.

DESCRIPTORS: *Pilotless aircraft, Aircraft, Operation, Reliability, Test methods, Weapons.

It is concluded that an environmental program should be established for each pilotless aircraft weapon system at the beginning of the design stage and be maintained throughout the life of the weapon system to eliminate environmental problems which represents a major part of reliability.

Chemical Engineering

PB 160 760 $7.60

American Potash and Chemical Corp., Los Angeles, Calif.
STATUS OF RESEARCH ON THE LARGE SCALE PRODUCTION OF HIGH PURITY BORON, by Harold Mazza and Dwight W. Sawyer. Quarterly technical progress rept. no. 1, 1 Mar-1 June 52, on Contract AF 33(616)488. 1 July 53, declassified 7 May 57. 80p. AD-13 634.

DESCRIPTORS: *Boron, Production, *Boron compounds, Oxides, Reduction.

Pilot plant facilities have been erected for the production of amorphous elemental boron based upon the magnesiothermic reduction of boron oxide (B_2O_3). The process consists essentially of placing a three to one mixture of B_2O_3 and magnesium powder in a stainless-steel crucible, and introducing this crucible under an ammonia atmosphere, into a furnace for initiation of the reduction reaction. The crude boron so produced is cooled, ground, and given a water leach followed by an acid leach. A description of the pilot plant process equipment, materials balance of the process, and production data are presented. A discussion is presented regarding the selection of the most suitable magnesium powder for raw material for the boron process.

PB 160 761 $3.60

American Potash and Chemical Corp., Los Angeles, Calif.
STATUS OF RESEARCH ON THE LARGE SCALE PRODUCTION OF ELEMENTAL BORON, by Harold Mazza and Dwight L. Sawyer. Quarterly technical progress rept. no. 2, 1 June-1 Sep 53, on Contract AF 33(616)488. 18 Sep 54, declassified 7 May 57. 35p. 1 ref. AD-17 642.

DESCRIPTORS: *Boron, Production, *Boron compounds, Oxides, Reduction.

A protective NH_3 atmosphere surrounding the B_2O_3-Mg charge during and subsequent to the occurrence of the reduction reaction had beneficial effects upon the purity of the product and was superior to an A atmosphere. The use of NH_3 and a 2.65:1 mixture of the B_2O_3-Mg powder yielded the highest B-content product. B produced from lower ratios contained Mg as a principal impurity, whereas B from higher ratios contained an unidentified impurity presumed to be O. The optimum quality of HCl required for leaching crude B was established, and various attempts were made to refine B. An appreciable degradation of amorphous elemental B occurred after exposure to atmospheric moisture. (See also PB 160 760)

HW-69586 (Rev) $1.60

Hanford Atomic Products Operation, Richland, Wash.
SAFETY REVIEW OF MANUFACTURING FACILITIES CHEMICAL PROCESSING DEPARTMENT, by R. E. Tomlinson. 23 June 61, 18p. 5 refs.

AD-282 936 $0.75

Naval Research Lab., Washington, D. C.
AN EVALUATION OF CERTAIN ASPECTS OF MULTIPURPOSE POWDER FIRE EXTINGUISHING AGENTS, by R. R. Neill and R. L. Tuve. Interim rept. 16 July 62, 21p. 10 refs. NRL rept. 5799.

DESCRIPTORS: *Fire extinguishers, Tests, Foams, *Powders, Wetting agents, Carbonates, Sodium compounds, Potassium compounds.

Class A fires of the wooden crib type were modeled on a small scale and correlated with Underwriters' Laboratories tests of multipurpose dry chemical fire extinguishing powders. Satisfactory agreement was obtained compared with water extinguishment on the same models. Multipurpose powders applied with proper technique, are effective in the extinguishment of rubber tire fires, but a solution of wetting agent in water shows measurable advantages in efficiency on this type of fire. Class B fires of the tank-confined gasoline fuel type using a piped dry chemical system are extinguished with equal amounts of both sodium bicarbonate type powders and multipurpose powders. Potassium bicarbonate dry chemical powders show a 30% weight efficiency superiority in the same tests. Low-temperature (minus 40°F) operation of the various candidate devices with their powders shows efficient discharge.

PB 181 346 $3.00

Southwest Research Inst., San Antonio, Tex.
INVESTIGATION OF THE USE OF ACOUSTIC VIBRATIONS TO IMPROVE HEAT TRANSFER RATES AND REDUCE SCALING IN DISTILLATION UNITS USED FOR SALINE WATER CONVERSION. Rept. on Contract 14-01-001-188. Aug 62, 159p. 8 refs. Office of Saline Water Research and Development progress rept. no. 65.

DESCRIPTORS: *Sea water, Water, *Desalination, *Distilling plants, *Heat transfer, Convection, Nucleate boiling, Boiling, Steam, Condensation, *Acoustics, *Vibration, *Ultrasonics, Economics, Scale, Countermeasures.

The effect of vibration on heat transfer from the inner tube to water in forced axial flow through an annulus was investigated at Reynolds numbers of 5,000 to 28,000. Transverse vibration of the inner tube produced significantly increased heat transfer rates. Improvement with annulus ratio of $d_2/d_1 = 2$ was 560% and 103% at flow Reynolds numbers of 5,000 and 28,000 respectively. Improvement with $d_2/d_1 = 3$ was 560% and 122% at flow Reynolds numbers of 5,000 and 24,000 respectively. Although percentage improvement was greater at low flow Reynolds numbers, the economic advantage increased with increasing Reynolds number. The use of vibration of the heat transfer surface to improve heat transfer in saline water conversion and other equipment shows promise of significant economic advantage.

Civil Engineering

PB 160 880 $1.60

California Forest and Range Experiment Station, Berkeley.
REMARKS ON ESTIMATION OF THE NUMBER OF FIRES DUE TO THE IGNITION OF TRANSIENT EXTERIOR KINDLING FUELS, by F. M. Sauer. Oct 55, 16p. (page 19 deleted). Interim technical rept, AFSWP-861.

DESCRIPTORS: *Radiological warfare, Surface targets, *Fuels, Combustion, Fires

The problem of estimating the number of fires, during nuclear attack, due to ignition of transient exterior kindling fuels is discussed, and the behavior of ignition points in starting continuing fires is formulated. Mathematical expressions for determination of the number of fires per unit area originating from this fuel classification are developed which lead to the specification of rational experimental and survey programs. (Author)

PB 160 879 $5.60

Forest Service, Washington, D. C.
DISTRIBUTION OF PRIMARY IGNITION POINTS FOLLOWING ATOMIC ATTACK ON URBAN TARGETS. TRANSIENT EXTERIOR FUELS, by Craig C. Chandler and Keith Arnold. Progress rept. 30 Mar 53, declassified. 53p. [AFSWP] Interim technical rept. 412.

DESCRIPTORS: *Radiological warfare, Surface targets, *Urban areas, Construction, *Fuels, *Ignition, Combustion, Wood, *Fires

Mass-fires — fire storms and conflagrations — may produce the principal damaging effects on urban targets following atomic attack. Probability that mass-fires will occur as well as their intensity and extent depend on distribution of ignition points, characteristics of fuels and topography, and weather conditions. This progress report presents results of surveys designed to determine number of primary ignitions in transient exterior kindling fuels. Primary ignitions are those caused directly by thermal radiation from atomic detonations.

AD-282 934 $2.00

Naval Civil Engineering Lab., Port Hueneme, Calif.
DEADMAN ANCHORAGES IN SAND, by J. E. Smith. 12 July 62, 85p. Technical rept. R-199.

DESCRIPTORS: *Construction, *Foundations (Structures), *Reinforced concrete, Stresses, Sand, Mathematical analysis.

PB 160 769 $7.60

American Potash and Chemical Corp., Los Angeles, Calif.
STATUS OF RESEARCH ON THE LARGE SCALE PRODUCTION OF ELEMENTAL BORON, by Harold Mazza, Dwight L. Sawyer, and Rodger W. Baier. Quarterly technical progress rept no. 7, 1 Sep-1 Dec 54, on Contract AF 33(616) 488. 1 Jan 55, declassified 7 May 57. 75p. 3 refs. AD-52 018.

DESCRIPTORS: *Boron, Production, Boron compounds, Oxides, Reduction, Magnesium, Chemical reactions.

A preliminary material balance, a flow sheet and a tentative operating time schedule are presented for a plant capable of producing 15,000 pounds of refined (95 per cent) elemental boron per month. The efficiency of the process on the basis of total boron may be materially increased by the addition of a boric acid recovery system as follows: the filtrate from the final acid leach is utilized in the crude boron digestion step; filtrates from both the crude boron digestion and the water leach of the fused B_2O_3 treatment are combined and neutralized with borax; this liquor is then concentrated and cooled to produce a crop of borac acid; the boric acid is dehydrated to boric oxide for return to the process. (See also PB 160 768)

PB 160 770 $6.60

American Potash and Chemical Corp., Los Angeles, Calif.
STATUS OF RESEARCH ON THE LARGE SCALE PRODUCTION OF ELEMENTAL BORON, by W. A. Gale, Dwight L. Sawyer and Rodger W. Baier. Quarterly technical progress rept. no. 8, 1 Dec 54-1 Mar 55, on Contract AF 33(616)488. 1 Apr 55, declassified 7 May 57. 61p. 6 refs. AD-62 628.

DESCRIPTORS: *Boron, Production, Boron compounds, Oxides, Reduction, Magnesium, Chemical reactions, Fluoborates, Potassium compounds, Sodium compounds, Borates, Chlorides, Chemical impurities.

Extension of the study of the magnesiothermic process to include the reactant ratio range of 1.5 to 0.5 has provided the following results: (1) all boron powders produced in the range of B_2O_3/Mg reactant ratios of 1.5 to 0.75 had oxygen contents of less than one per cent; (2) in the same range, the magnesium content of the products increased gradually from 11 to 14 per cent. However, between the 0.75 and 0.5 ratio a sudden transition occurred, the magnesium content of the product from the 0.5 ratio being 24.4 per cent. Coincidental with this change, a sudden drop in both product yield and particle size were observed, together with an increase in the oxygen content; (3) these reduction reactions occurred at high temperatures and were marked by their violent nature; maximum violence appeared over the range of ratios between 1.2 and 0.75 (4) the 1.5 ratio of reactants has been tentatively chosen as optimum for producing high magnesium-bearing boron with minimum oxygen content. (See also PB 160 769)

PB 160 771 $5.60

American Potash and Chemical Corp., Los Angeles, Calif.
STATUS OF RESEARCH ON THE PRODUCTION OF ELEMENTAL BORON, by W. A. Gale, Dwight L. Sawyer and others. Quarterly technical progress rept. no. 9, 1 Mar-1 June 55, on Contract AF 33(616)488. 1 July 55, declassified 7 May 57. 51p. 8 refs. AD-68 443.

DESCRIPTORS: *Boron, Production, Boron compounds, Oxides, Reduction, Magnesium, Chemical reactions, Fluoborates, Potassium compounds, Sodium compounds, Borates, Chlorides, Electrolysis, Chemical impurities.

Further tests to determine the optimum B_2O_3-Mg reactant ratio for producing high Mg-bearing B revealed that reactant ratios between 0.7 and 1.5 had little effect upon the B assay of the final leached product. Suboxide formation was indicated at ratios below 0.6. Both molten KBF_4 and Cl rendered the Mg acid soluble to the same extent as did B_2O_3. The equilibrium between KBF_4 and its hydrolysis products was shifted away from the latter with HCl in the preparation of O-free KBF_4. Products containing 97 to 98.3% B were obtained from the H reduction of BBr_3 at high temperatures. Preliminary investigations of the Na reduction of BCl_3 in an enclosed stainless steel reactor resulted in reaction products which contained large amounts of unaccounted for constituents. A preliminary literature survey was conducted on the electrolytic production of elemental B, and some exploratory experiments are reported. Unsuccessful attempts were made to produce high purity MgB_2 for X-ray calibration purposes. Pilot-plant data covering the production of B from B_2O_3 are summarized, and the results of pilot-plant-scale tests on the Mg reduction of $Na_2B_4O_7$ are included. (See also PB 160 770)

AD-281 887 $2.25

Defense Metals Information Center, Columbus, Ohio.
CHEMICAL VAPOR DEPOSITION. Rept. on Contract AF 33(616)7747. 4 June 62, 87p. 93 refs. DMIC rept. 170.

DESCRIPTORS: *Vapor plating, *Metal coatings, Refractory coatings, *Thin films, *Crystals, *Metal-organic compounds, Decomposition, Diffusion, Phase transitions, Gases, Metallic smoke deposits, Carbon deposits.

Contents:
The promise and problems of chemical vapor deposition, by J. M. Blocher, Jr.
The growth of crystalline films and layers by chemical vapor deposition, by E. M. Sherwood and R. C. Himes
The science of whisker growth, by E. E. Underwood and C. F. Powell
The science of metal-organic decomposition, by E. H. Hall and A. Levy
Fundamental considerations in the chemical vapor deposition of diffusion coatings, by C. A. Krier
Vapor-phase-transfer processes during chemical vapor deposition, by J. H. Oxley.

PB 160 808 $19.75

Bell Telephone Labs., Inc., Whippany, N. J.
ESSA. Quarterly rept. no. 18 (Final), Apr 55-Dec 59, on Contract AF 33(616)5499. [1960] 342p. WADD-TR-60-284; AD-237 581.

DESCRIPTORS: *Radar scanning, *Radar antennas, *Search radar, Radar equipment, Airborne, Phase shifters, Ferromagnetic materials, Stabilization, Antennas, K band.

The objectives of Project ESSA (Electrical Scanning and Stabilizing of Antennas) were the study of techniques for electrical scanning with ferrite phase shifters and the demonstration of the feasibility and practicability of these techniques by the construction and operation of an experimental antenna model. This report shows that reciprocal and nonreciprocal ferrite phase shifters can be designed by following the criteria obtained from analysis of ferrite-loaded waveguides. Extensive studies of ferrite materials for phase-shifter applications led to specific materials suitable at various frequency bands, such as X-band, K_u-band, and K_a-band. It is also shown that the power-handling capability of a ferrite phase shifter can be improved at the expense of increasing its size and insertion loss. Emphasis is on parallel-fed array structures in which the input power is split into many parts before reaching the ferrite phase shifters.

WAPD-TH-435 $1.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
EFFECTS OF D-C ELECTRICAL FIELDS ON THERMOCOUPLE ACCURACY, by T. W. Hunt. Rept. on Contract AT(11-1)-GEN-14. 15 Aug 58, 11p.

WAPD-TH-434 $1.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
POWER PROGRAMMING FOR USE IN TRANSIENT BURNOUT AND PRESSURE DROP STUDIES, by T. W. Hunt. Rept. on Contract AT(11-1)-GEN-14. 8 Sep 58, 11p.

PB 160 816 $12.00

Collins Radio Co., Cedar Rapids, Iowa.
THE ENGINEERING INVESTIGATION FOR THE DESIGN, DEVELOPMENT AND FABRICATION OF THE COMMUNICATIONS SET, DIGITAL AN/GSC-4. Rept. on Contract AF 30(602)1932. 1 Apr 59, 164p. Rept. no. IDR-W481; RADC-TN-59-19; AD-209 070.

DESCRIPTORS: *Data transmission systems, *Multichannel telephone systems, *Antiaircraft defense systems, *Communication systems, Design, Construction.

The communications set, digital AN/GSC-4, is a flexible, compact unit capable of reliably conveying synchronous digital data over telephone voice facilities of nominal 4-kc bandwidth at a maximum 5400 bits-per-sec rate. This set utilizes phase-shift modulation, frequency multiplexing, and encodes either 2 or 3 channels of information on each tone in order to reduce the frequency spectrums ordinarily required for high-speed data transmission. The set includes sufficient conversion equipment for transmitting and receiving Sage type data at 1300 or 2600 bits-per-second, 16 channels of mixed-speed teletype data rates, or up to 5400 bits of serial data per second. The maximum error rate is less than 1 in 10^5 bits for Sage type data transmission. (Author)

AD-281 841 $0.75

Diamond Ordnance Fuze Labs., Washington, D. C.
NUCLEAR RADIATION DAMAGE TO TRANSISTORS. VOLUME II. PERMANENT DAMAGE, PART I: THEORETICAL ASPECTS, by Martin J. Cooper and M. Gay Payne. 28 June 62, 25p. 14 refs. Rept. no. TR-975, Suppl. 1.

DESCRIPTORS: *Transistors, *Radiation damage, Fast neutrons, Neutron detectors, Radioactivity, Test methods, Germanium alloys, Mathematical analysis.

This paper presents a mathematical analysis of neutron damage to transistors. The approach involves statistical considerations of the variation of minority carrier lifetime τ, thereby providing a direct calculation of the damage factor K, previously considered an empirical constant. It is thus possible to calculate the change of common-emitter current gain (β) and collector leakage current (I_{co}) due to neutron exposure. Calculations agree reasonably well with experimental observations. (Author) (See also AD-270 264)

PB 160 820 $1.60

Dunlap and Associates, Inc., Stamford, Conn.
HUMAN FACTORS REVIEW OF RADIO SET AN/GRC-53( ). Final rept. on Contract DA 36-039-sc-73253. Sep 59, 13p. AD-231 903.

DESCRIPTORS: *Radio communication systems, *Radio equipment, Communication equipment, *Control panels, Operation, Human engineering.

The Radio Set AN/GRC-53( ) is reviewed in terms of the human factors involved in the control panels of the Radio Transmitter T-682( )/GRC, the Radio Receiver R-880( )/GRC, and the Electrical Filter Assembly F-399( )/GRC. The above mentioned panels are considered well designed. Suggestions are made for minor modifications of the present design and more radical changes for future models. (Author)

AD-282 213 $1.50

General Atomic Div., General Dynamics Corp., San Diego, Calif.
FLAT-PLATE SOLAR THERMOELECTRIC CONVERSION PANELS, by Arthur N. Himle, Daniel S. Brush and others. Final rept. Nov 60-Dec 61, on Contract AF 33(616) 7676. May 62, 53p. 3 refs. Rept. no GA-2823; ASD-TDR-62-214.

DESCRIPTORS: *Solar energy, *Solar cells, *Thermoelectric converters, *Space flight *Power supplies, Lead compounds, Tellurides, Zinc compounds,

Various sizes of reinforced-concrete deadman anchorages were tested in sand to obtain information for improving or expanding design criteria. Deadman holding capacities and reaction patterns under applied loads were determined and an empirical equation was developed by which both the capacities and reaction patterns can be calculated. (Author)

AD-282 933 $1.25

Naval Civil Engineering Lab., Port Hueneme, Calif.
MULTIPURPOSE MOBILIZATION BUILDING, by J. J. Hromadik and R. A. Bliss. 25 June 62, 45p. Technical rept. R-196.

DESCRIPTORS: *Construction, Structures, *Concrete, *Buildings, *Prefabricated buildings

This report describes the construction of a multipurpose building of precast thin-shell concrete panels cast from plastic-coated plywood and structural plastic forms. (Author)

Electrical and Electronic Engineering

PB 160 819 $4.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
ANTENNA PHENOMENA RESEARCH, by Robert G. Kouyoumjian and Edward K. Damon. Final rept. 1 Nov 55-31 Oct 59, on Contract DA 36-039-sc-70174. 1 Nov 59, 41p. Rept. no. 662-36; AD-233 600.

DESCRIPTORS: *Antennas, Analysis, Design, *Conical antennas, *Loop antennas, *Helical antennas, Polarization, Ferrites, *Antenna radiation patterns, *Radar reflections

The general areas of research were uniform and modulated surface-wave antennas, conical antennas, helical and loop antennas, antenna polarization properties, broad-band circular polarizers, back-scattering, microwave ferrites, the reaction concept, and instrumentation for antenna pattern and radar reflection measurements. The individual problems falling within each of these areas are described and the pertinent conclusions resulting from the research are given. A list of technical reports and papers, both oral and written, pertaining to these investigations is presented. (Author)

PB 160 785 $13.00

Arinc Research Corp., Washington, D. C.
RELIABILITY OF SWITCHING MECHANISMS, by John Christian and Kurt W. Hollander. Rept. on Contract AF 39(602)2143. Jan 61, 188p. 84 refs. Publication no. 125-1-203; RADC TR-60-239; AD-250 370.

DESCRIPTORS: *Electronic switches, Switching circuits, *Electronic relays, *Transistors, Reliability, Quality control, Electronic equipment, Probability, *Electric relays, Relays, Semiconductors, Diodes, Germanium, Silicon, Specifications, Life expectancy, Tests, Mathematical analysis.

This report presents a theoretical model of standby reduncancy and employs this model to determine typical application areas for several types of switching mechanisms. Mathematically derived interrelationships between reliabilities are displayed in graphical form. A survey of the state-of-the-art shows that relays exhibit a failure rate of approximately five failures per million hours in environments common to ground-based equipment. There are indications that this level of reliability can be bettered by improvements in specifications, test procedures, and manufacturing techniques. A similar survey relating to transistors indicates that an observed failure rate of approximately one failure per million hours can be expected in ground-based digital applications. Since the transistor is an active device, capable of operation over a wide range of impedance and power levels, no particular mis-matching problems are considered to exist in the application of these devices to circuits employing standby redundancy. (Author)

AD-281 796 $2.25

Armour Research Foundation, Chicago, Ill.
SEMICONDUCTOR DIODE PERFORMANCE IN NUCLEAR RADIATION ENVIRONMENTS, by Harlan G. Hamre, Raymond C. Barrell, and William N. McElroy. Final rept. 15 Apr 60-15 Aug 61, on Radiation Tolerant Electronic Components, Contract AF 33(616)7329. May 62, 89p. 21 refs. ASD-TDR-62-12.

DESCRIPTORS: Germanium, Microwave equipment, Silicon, *Radiation damage, *Diodes, *Semiconductors, Fast neutrons.

The performance characteristics have been determined for two types of general purpose diodes, and for five types of microwave diodes, in radiation environments equivalent to at least 1000 hours' exposure to 10^{10} neutron/ cm^2 -sec and $2x10^5$ Rad/hour. None of the units studied showed satisfactory performance characteristics after this exposure, although the germanium 1N263 point-contact diode was degraded less than others investigated, and still exhibited measurable properties following the exposure. Results, although not conclusive, seem to indicate that energizing the microwave mixers at x-band (9375 Mc) during radiation is helpful in prolonging the life of the units. (Author)

PB 160 793 $4.60

Army Signal [Research and Development Lab.] Fort Monmouth, N. J.
DISTRIBUTED CONSTANT IMPEDANCE TRANSFORMERS, by Donald W. Rouse. 3 Mar 58, 43p. 9 refs. Technical memo. no. M-1894; AD-156 263.

DESCRIPTORS: *Impedance, *Transformers, Radiofrequency transformers, Design, Impedance matching, Mathematical analysis, *Transmission lines.

The characteristics of, and design equations for, both stepped and tapered impedance transformers are presented. Although this program was undertaken primarily to design impedance transformers in the 100 to 1,000 mc frequency range, the results are valid to all frequencies for which distributed constant theory is applicable. (Author)

Possible input circuits and components for Task II (Current Relay) are analyzed and test results are presented. The components discussed include the isolation transformers, unijunctions, silicon controlled rectifiers, four-layer diodes, and transistors (Schmitt Trigger). A simplified and improved static transistor relay circuit for use in Task III (Basic Relay) is presented. (Author) (See also PB 160 794-1)

PB 160 794-3 $2.60

Kidde, Walter, and Co., Inc., Belleville, N. J.
STATIC SWITCHING DEVICES, by Robert Langfelder. Quarterly progress rept. no. 3, 1 May-31 July 60, on Contract DA 36-039-sc-85240. [1960] 27p. Rept. no. 2202-Q3; AD-249 255.

DESCRIPTORS: *Electronic switches, *Electronic relays, *Switching circuits, *Electronic circuits, Transistors, Photoconductivity, Design, Cadmium compounds, Selenides, Electronic equipment.

The major factors determining the characteristics of the relay proposed for Task III (Basic Relay) are investigated and analyzed. The characteristics of the basic photoconductor materials are evaluated, and some data obtained using the type selected as best for Task I (Signal Switching Relay) are presented and discussed. A new alternate approach to Task I is described. An improved front end for Task II (Current Relay) is presented. (Author) (See also PB 160 794-2)

PB 160 775

Lincoln Lab., Mass. Inst. of Tech., Lexington.
EXPERIMENTAL INVESTIGATION OF WIND-INDUCED VIBRATIONS IN ANTENNA MEMBERS, by William Weaver, Jr. Rept. on Contract AF 19(604)5200, 26 Aug 59, 101p. 37 refs. Group rept. no. 75-4; AD-231 946.

DESCRIPTORS: *Antennas, *Aerodynamics, *Vibration, *Radar antennas, *Wind, Physical properties, Analysis, Mathematical analysis.

The present investigation deals with the generation and suppression of wind-induced vibrations in the circular aluminum tubular members of large radar antenna space frames. Failures and undesirable vibrations have occurred in individual members of this type of facility, and a means of analyzing and reducing their response is required. The experimental portion of the investigation consists of wind tunnel tests on stationary cylinders, oscillating cylinders, and vibrating flexural members. The significant results of the test program are the following: (1) a continuous curve for the RMS value of the Karman lift coefficient was obtained for the range of Reynolds numbers of interest in this investigation, (2) a curve expressing the extent of the self-amplification characteristics of members was determined, (3) a system of aerodynamic spoilers was tested and optimized, and (4) non-dimensional Strouhal frequencies were evaluated and compared with established values. Experimental results are combined with theoretical developments to give a semi-empirical solution to the response problem in the form of graphical analysis charts. Design and analysis procedures are outlined, and the use of optimized spoilers is recommended for applicable cases. (Author)

PB 160 831 $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
REVIEW OF REACTANCE AMPLIFIER CIRCUIT THEORY, by C. Blake. Rept. on Contract AF 19(604) 5200, 7 July 60, 34p. 14 refs. Rept. no. 46G-0004; AD-239 659.

DESCRIPTORS: *Microwave amplifiers, *Electronic circuits, Theory, *Noise (Radio), Mathematical analysis.

A review of reactance amplifier circuit theory is presented which covers the following areas: (1) one port amplifier, (2) difference frequency amplifier, (3) noise, (4) four frequency amplifiers, and (5) power considerations.

AD-282 275 $4.00

Lockheed Aircraft Corp., Sunnyvale, Calif.
INVESTIGATION OF THRESHOLD SWITCHING TECHNIQUES FOR DIGITAL COMPUTERS, Final rept. 20 Mar 61-31 Jan 62, on Contract AF 33(616)8035. June 62, 283p. 26 refs. Rept. no. 2-01-62-1; ASD TDR-62-308.

DESCRIPTORS: *Digital computers, *Mathematical logic, *Combinatorial analysis, *Switching circuits, *Electronic switches, Electrical networks, Signal-to-noise ratio, Functions, Design, Mathematical analysis, Synthesis, Feasibility studies.

Given are: theoretical aspects of threshold functions; synthesis methods for specifying networks of threshold devices; techniques to determine linear separability; weights and threshold for LSF's; algorithms for partitioning switching functions into sets of threshold functions; techniques for decomposing networks of unconstrained threshold devices into networks of devices satisfying certain design constraints; effects of noise and tolerances in several types of circuits suitable for threshold devices to determine the important design constraints; logical design examples to demonstrate the general utility of threshold functions. (Author)

PB 160 882 $3.60

Mallory, P. R., and Co., Inc., Indianapolis, Ind.
SUBMINIATURE VARIABLE RESISTORS, by Howard Reeve and Harold Austin. Quarterly progress rept. no. 1, 15 Feb-15 May 56, on Contract DA 36-039-sc-71165. [1956] 34p. 1 ref.

DESCRIPTORS: *Resistors, *Variable resistors, Design, Tests, *Subminiature electrical equipment, Electrical equipment, Bushings.

The object of this contract is to conduct a research and development program to complete the establishment of designs for Resistors, Variable, Subminiature and the fabrication of samples for component testing purposes. Objectives, during the first quarter, have been to study the existing designs, and to propose modifications and test new design features in the process of design improvement. (Author)

Antimonides, Semiconductors, Bounding, Coatings, Thermal stresses, Thermoelectricity.

Procedures have been developed for the construction of a lightweight solar energy converter, using thermoelectric materials sandwiched between flat sheets of aluminum. Two panels, each one foot square, have been delivered to the Flight Accessories Laboratory, Aeronautical Systems Division. Each panel contains 153 n-type PbTe elements and 153 p-type ZnSb elements, arranged in eighteen alternating rows of seventeen elements each. According to measurements made on test panels constructed in a similar fashion, the delivered panels are capable of an output of at least 1.33 w/ft^2 when subjected to an incident energy of 1400 w/m^2, which is equal to the solar energy intensity at the Earth's distance from the sun. At this output, the solar panel weighs 96 pounds per electrical kilowatt. The observed output is lower than is calculated from the properties of the materials used; however, it is anticipated that improved performance can be obtained in future panels. (Author)

AD-281 829 $1.75

Hoffman Electronics Corp., El Monte, Calif.
DESIGN STUDY OF SOLAR ENERGY MEASUREMENT TECHNIQUES, by Bernd Ross and D. B. Bickler. Rept. for Mar 61-15 Jan 62 on Study and Applied Research on Measurement Techniques for Solar Energy Converters, Contract AF 33(616)7946. June 62, 70p. ASD TN-61-156.

DESCRIPTORS: *Solar energy, *Solar cells, Measurement, Light, Sources, Computers, Test equipment, *Power supplies, Phonons, Encapsulation, Silicon, Computers, Wiring diagrams, *Space flight.

This contract is concerned with the fabrication of a portable solar cell tester which will present solar cell power output data for space conditions. The initial phase of the work deals with the measurement of solar cell performance and characteristics of available light sources in order to establish the basic design parameters for the tester. The operational design of the tester is described. Solar cell performance data and characteristic tolerances are given. The design of a new primary reference solar cell is described and a calibration procedure resulting in the absolute spectral response is set forth. (Author)

PB 160 803 $3.60

Hughes Aircraft Co. [Culver City] Calif.
PHONE LINE DIGITAL TRANSMISSION STUDY, by E. Enriquez, D. H. Thompson and others. Rept. on Contract AF 30(602) 1954. [1960] 38p. RADC-TR-60-189; AD-244 829; Addendum to AD-244 193.

DESCRIPTORS: *Data transmission systems, Test sets, *Digital systems, *Telephone communication systems, Design, Coding, Errors.

The formulation and design of a Digital Error Measuring Set (DEMS) for testing data transmission systems is presented. Indirectly related to this problem is the subject of correcting possible linear distortion on telephone channels. The consideration of this subject culminates in the design of a high quality and efficient universal delay equalizer. Error and transmission rates implications with respect to coding are drawn in connection with feedback-controlled digital communications systems. (Author)

AD-278 647 $2.75

Inland Testing Labs., Dayton, Ohio.
ALKALINE BATTERY EVALUATION, by W. W. Clark, W. G. Ingling, and I. F. Luke. Semi-annual rept. no. 3, 15 Oct 61-15 Apr 62, on Contract AF 33(616)7529. June 62, 122p. 5 refs. ASD-TDR-62-553; supersedes ASD Technical rept. 62-68, AD-273 688.

DESCRIPTORS: Alkaline cells, Life expectancy, Electrical properties, Tests, Test facilities, Instrumentation, Spaceships, Satellite vehicles, Electrical equipment, Power supplies, Design, *Alkaline batteries, Cadmium, Nickel, Zinc

This report covers the first three periods of an alkaline battery applied research and failure analysis program. The purpose of this program is to establish a broad base of battery test data for use in the design of the electrical system of future space vehicles and to determine the actual failure mechanism of all new battery systems under varying envrionmental and cycle-life conditions so that improved space batteries can be developed. Another objective is to determine techniques and/or materials to prevent these failures, while at the same time increase the usable watt-hours-per-pound capability and cycle life of the battery.

PB 160 794-1 $3.60

Kidde, Walter, and Co., Inc., Belleville, N. J.
STATIC SWITCHING DEVICES, by Robert Langfelder. Quarterly progress rept. no. 1, 1 Nov 59-31 Jan 60, on Contract DA 36-039-sc-85240. [1960] 35p. Rept. no. 2202-Q1; AD-238 218.

DESCRIPTORS: *Electronic switches, *Electronic relays, Design, *Teletype systems, Teletype equipment, *Switching circuits, Electronic circuits, Electronic equipment, Radiofrequency coils, Rectifiers.

The design and characteristics of a static relay developed for a teletype application are discussed. Some circuitry developed for a static current relay using controlled rectifiers is illustrated and some design parameters are analyzed. The general approach to all tasks to be performed is presented. (Author)

PB 160 794-2 $3.60

Kidde, Walter, and Co., Inc., Belleville, N. J.
STATIC SWITCHING DEVICES, by Robert Langfelder. Quarterly progress rept. no. 2, 1 Feb-30 Apr 60, on Contract DA 36-039-sc-85240. [1960] 39p. Rept. no. 2202-Q2; AD-241 763.

DESCRIPTORS: *Electronic switches, *Electronic relays, *Switching circuits, Electronic circuits, Design, Rectifiers, Transistors, Diodes, Circuits, Semiconductors, Silicon.

NASA N62-10562 $9.10

Space Physics Research Lab., U. of Michigan, Ann Arbor.
DEVELOPMENT OF A DIGITIZED VOLTAGE GENERATOR FOR IONOSPHERIC PROBE MEASUREMENTS, by G. D. Breen. Rept. on Contract NASw-139. Oct 61, 110p. 6 refs. Scientific rept. no. JS-4. Rept. no. 03599-8-S.

PB 160 796-1 $4.60

Speer Carbon Co., Niagara Falls, N. Y.
STUDIES ON LOW CONDUCTIVITY, HIGH STABILITY, SEMICONDUCTOR FILM RESISTORS, by F. Collins. Quarterly rept. no. 1, 1 July-30 Sep 59, on Contract DA 36-039-sc-78963. [1959] 50p. 257 refs. AD-229 428.

DESCRIPTORS: *Semiconducting films, Electrical properties, Silicon, Boron, Germanium, *Bibliography, *Resistors.

A search of the literature was conducted and a bibliography compiled of references dealing with the electrical properties and methods of preparation of semiconducting materials in the form of films. The articles concerned with elemental or intermetallic film materials have been reviewed, with special attention given to the variation of resistivity with temperature. It was concluded that it may be possible to prepare films of impurity-doped silicon which would have a very small temperature coefficient of resistance, but that the stability of such films might be poor and their resistivity values lower than desired. Films consisting principally of germanium and boron were judged to be somewhat less promising but possible candidates. The intermetallic compounds were observed to be generally low in melting point and frequently unstable in air. It was also decided that they may be difficult to prepare reproducibly in the form of thin films. A few preliminary films of silicon have been prepared by vacuum evaporation from a boron nitride crucible. The resistance of the films and its stability appear to be markedly dependent on substrate temperature. (Author)

PB 160 796-2 $1.60

Speer Carbon Co., Niagara Falls, N. Y.
STUDIES ON LOW CONDUCTIVITY, HIGH STABILITY, SEMI-CONDUCTOR FILM RESISTORS, by F. Collins. Quarterly rept. no. 2, 1 Oct-31 Dec 59, on Contract DA 36-039-sc-78963. [1960] 16p. 3 refs. AD-234 342.

DESCRIPTORS: *Semiconducting films, Thin films, Silicon, *Resistors, Electrical properties, Stability, Design.

It has been found possible to deposit films of silicon by vacuum evaporation on substrates maintained at temperatures up to the melting point of silicon. The films deposited at lower temperatures had a high resistivity and were very unstable. Those prepared at higher substrate temperatures had a greater conductivity and a better resistance-temperature characteristic. The crystalline structure of the latter films was shown by x-ray diffraction to be more perfect. A post heat treatment of the films in different atmospheres appears, pending further study, to improve the resistance-temperature characteristic. The preliminary results obtained to date appear encouraging and warrant further study of evaporated silicon films. (Author) (See also PB 160 796-1)

PB 160 796-3 $1.60

Speer Carbon Co., Niagara Falls, N. Y.
STUDIES ON LOW CONDUCTIVITY, HIGH STABILITY, SEMICONDUCTOR FILM RESISTORS, by F. M. Collins. Quarterly rept. no. 3, 1 Jan-31 Mar 60, on Contract DA 36-039-sc-78963. [1960] 20p. 1 ref. AD-239 282

DESCRIPTORS: *Semiconducting films, Thin films, *Resistors, Stability, Design, Silicon, Temperature, Semiconductors, Intermetallic compounds, Electrical properties.

The system developed for the deposition of silicon films on heated substrates by vacuum evaporation was used extensively and proved to be durable, free of contamination, and capable of satisfactory control. A number of variables were investigated as to their effect on the resistance and temperature coefficient of resistance at room temperature, including the pre-evaporation conditions, substrate temperature, deposition rate, vacuum annealing temperature, and substrate material. The best temperature coefficient which was obtained reproducibly to date is a negative value of 400 ppm on films having a resistivity of 0.02 ohm-cm. (Author) (See also PB 160 796-2)

PB 160 796-4 $1.60

Speer Carbon Co., Niagara Falls, N. Y.
STUDIES ON LOW CONDUCTIVITY, HIGH STABILITY, SEMICONDUCTOR FILM RESISTORS, by F. M. Collins. Quarterly rept. no. 4, 1 Apr-30 June 60, on Contract DA 36-039-sc-78963. [1960] 20p. 1 ref. AD-243 677.

DESCRIPTORS: *Semiconducting films, *Resistors, Semiconductors, Silicon, Manufacturing methods, Tests, Intermetallic compounds, Heat treatment, Argon, Stability, Thin films.

Silicon films made by vacuum evaporation under different conditions were heat treated in argon under a variety of conditions of time and temperature. Some of those treated were found to possess a temperature coefficient of resistance of less than 200 ppm/C^{o}. Conditions for obtaining this result were found to be very critical, but most success was obtained with films deposited at 900^{o}C and annealed at 1375^{o}C for about 10 seconds. The films exhibited a coarse-grained appearance after such a heat treatment. In previous work it was reported that the resistance and temperature coefficient of resistance of silicon films deposited on ceramic substrates as received were very high in comparison to those values for silicon films on polished fused quartz. It has subsequently been shown that the values for films deposited on lapped ceramics are the same to within our experimental error as those for polished quartz. (Author) (See also PB 160 796-3)

PB 160 826 $4.60

Motorola, Inc., Phoenix, Ariz.
STUDY OF MEANS OF MAKING MAXIMUM EFFECTIVE USE OF RADIO SYSTEMS, by R. A. Richardson and L. J. Wunderlich. Final rept. 28 June 56-17 Sep 59, on Contract DA 36-039-sc-73085, continuation of Contract DA 36-039-sc-64737. [1959] 43p. 10 refs. AD-234 047.

DESCRIPTORS: *Radio equipment, *Radio communication systems, Sidebands, Mobile, Military requirements, Modulation, Radio receivers, Noise (Radio), Reduction, Tests, *Signal generators, *Transistors, Radiofrequency pulses, Radio transmission, Intercommunication systems

Research summarizes the results of seven separate tasks as follows: Task A - investigation and evaluation of problems encountered in a single sideband radio central; Task B - mitigation of impulse noise in single sideband radio central system; Task C - study of dial pulse transmission over radio central circuits; Task D radio intercom; Task E - single sideband signal generator for communication central AN/MRC-66; Task Task F - AN/MRC-66 communication central field test plan; and Task G - transistor applications study for communication central AN/MRC-66.

PB 160 883 $5.60

Narda Microwave Corp., Mineola, N. Y.
BROADBAND RIDGE WAVEGUIDES AND COMPONENTS, by Adolph Brenner. Quarterly progress rept. no. 1, 1 Dec 58-28 Feb 59, on Contract DA 36-039-sc-78187. 31 Mar 59, 57p. 5 refs. Rept. no. 5049.

DESCRIPTORS: *Waveguides, Broadbands, *Microwave equipment, Wave transmission, Electrical properties, Mechanical properties.

This contract involves research leading to the design and development of broadband waveguides and components for the transmission of TE_{10} mode energy in a structure employing either single or double ridged cross sectional geometries. These waveguides span the frequency spectrum from 0.39 to 40.0 KMC in two sets of waveguides having 2.4:1 and 3.6:1 bandwidths. The scope of this work includes development and fabrication of components in the 4.75 KMC to 11-0 KMC range. All other bands have been investigated to the extent of determining optimum waveguide cross sections. (See also PB 155 023)

PB 160 821 $6.60

National Carbon Co, Inc., Cleveland, Ohio.
FABRICATION OF PAPER LINED DRY CELLS FOR BATTERIES UTILIZING SYNTHETIC MANGANESE DIOXIDE, by S. A. Martosko. Final rept. 18 Mar 57-30 Nov 59, on Contract DA 36-039-sc-73217. [1959] 67p. AD-231 779.

DESCRIPTORS: *Dry cells, Production, Paper, Manganese compounds, Dioxides.

Fabricating paper lined primary type dry cells and batteries incorporating the use of a synthetic MnO_2 was accomplished successfully to provide the necessary characteristics required for high capacity and good shelf life. (Author)

OTS SB-432 Suppl. 1 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
THERMOELECTRICITY. Jan 62, 7p. 116 refs. OTS Selective Bibliography SB-432, Suppl. 1.

DESCRIPTORS: *Thermoelectricity, Electricity, Materials, Semiconductors, Cooling, Temperature control, Instrumentation, Thermoelectric generators, Generators, *Bibliography

Lists 116 reports and translations added to the OTS collection during the period September 1960 to January 1962. Covers research on properties of thermoelectric materials, measurements for thermoelectric materials, peltier cooling of semiconductor components, temperature control devices, thermoelectric energy converters and generators among other subjects. (Author)

OTS SB-428 Suppl. 1 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
TRANSDUCERS. July 62, 11p. 166 refs. OTS Selective Bibliography SB-428, suppl. 1.

DESCRIPTORS: *Transducers, *Bibliography, Electroacoustic transducers, Magnetostriction transducers Photoelectric transducers, Piezoelectric transducers, Underwater sound, Telemeter systems, Electronic equipment

Lists 166 foreign and domestic reports added to the OTS collection during the period Aug 60-July 62. Covers research on transducer materials, temperature regulators, pressure and density sensors, calibration methods, and various types of transducers such as; underwater sound, high power, telemetry, solid state, piezoelectric, microminiature, electroacoustic, magnetostrictive, photoelectric transducers among other subjects. (Author)

PB 160 795 $8.60

Servo Corp. of America, Long Island, N. Y.
OPERATING AND MAINTENANCE DATA FOR TINKERTOY ANTENNA GROUP. Rept. on Contract DA 36-039-sc-64689. May 57, 92p.

DESCRIPTORS: Electronic equipment, Radar equipment, Operation, Maintenance, *Antennas, Antenna radiation patterns, *Radar antennas, Impedance matching, Excitation, Reflectors, *Radio waves, *Electromagnetic waves, Theory, Dipole antennas, Coupled antennas, Polarization, Radiofrequency, Range.

The Tinkertoy Antenna Group is a transportable kit of inexpensive and lightweight antenna components capable of simple field assembly for the interception of electromagnetic signals throughout the frequency range of 24 to 1030 Mc.

DESCRIPTORS: *Electric relays, Tests, *Conductors, Contamination, Insulating materials, *Electric insulation, Vaporization, Electrical equipment, *Sliding contacts, Exposure, *Palladium, *Gold, Surfaces, Resistance, Deposits, Vapors, *Heat treatment, Electronic equipment

Following is the progress which has been made in a study of contact contamination in sealed relays: (1) Base metal contamination was found on a majority of the contacts tested in relays from six manufacturers; (2) In controlled laboratory experiments pure organic compounds were shown to react at noble metal surfaces producing high resistance films. Surface treatment of the contact is probably an important factor in this reaction; (3) An organic growth was found on palladium contacts in defective sealed relays. It may represent polymer formation under static conditions; (4) Silver sulfide whiskers growing on silver-plated contacts were found in a paper-wrapped connector. Sulfur from the paper was though responsible; (5) The BTL miniature dry reed switch has a contact resistance in the range of 75 to 115 milliohms under dry circuit load. (Author) (See also PB 158 266)

PB 160 806 $3.60

Union Thermoelectric Div., Comptometer Corp., Niles, Ill.
ULTRAMINIATURE MILITARY QUARTZ CRYSTAL UNITS, by R. E. Bennett, L. A. Tyler, and J. T. Lavan. Quarterly progress rept. no. 1, 15 June-14 Sep 60, on Contract DA 36-039-sc-85348. [1960] 32p. AD-246 219.

DESCRIPTORS: *Quartz resonators, Quartz crystals, *Subminiature electronic equipment, Design, Military requirements, Manufacturing methods, Production, Electrical properties.

The purpose of this research is to conduct theoretical and experimental investigations to determine the factors that limit the reduction in size of AT cut quartz crystal resonators, beginning with the frequency range and overtone number where the smallest possible size is likely to be attainable. The units shall be considered acceptable if the quality factor (Q) is 10,000 or above. Other specifications are standard, such as ± 50 ppm over the temperature range -55°C to + 90°C. A usable drive power shall be recommended. Since the quality specification is in terms of Q, means for impedance transformation shall be investigated, if necessary, to enable the use of high resistance units in practical transistor circuits. Suitable methods of mounting, bonding, and sealing shall be devised. (Author)

PB 160 772 $3.60

Western Electric Co., Inc., Winston-Salem, N. C.
INDUSTRIAL PREPAREDNESS STUDY. LACQUER FILM CAPACITORS, by H. K. Jordan. Quarterly progress rept. no. 4, 25 Nov 59-25 Feb 60, on Contract DA 36-039-sc-81268. [1960] 35p. AD-233 746.

DESCRIPTORS: *Capacitors, Machine tools, *Dielectric films, Manufacturing methods, Preparation, *Industrial production, Test equipment

Effort was directed primarily toward the installation and prove-in of facilities and special tooling. Particular effort was expended in the areas of mixing, lacquering, and metalizing to prove-in and run process capability studies on this equipment so that film may be available for process studies of subsequent operations. (Author) (See also PB 153 380)

PB 160 773 $3.60

Western Electric Co., Inc., Winston-Salem, N. C.
INDUSTRIAL PREPAREDNESS STUDY. LACQUER FILM CAPACITORS, by J. B. Rawls. Quarterly progress rept. no. 6, 25 May-25 Aug 60, on Contract DA 36-039-sc-81268. [1960] 33p. AD-243 067.

DESCRIPTORS: *Capacitors, Manufacturing methods, Quality control, Varnishes, *Dielectric films, Industrial production, Polymers, Styrenes, Acetates, Films, Materials, Metalation, Impregnation, Metals

An evaluation of the lacquering process and equipment resulted in some modifications of the lacquering machine. Several lots of capacitors were impregnated with a polyethylene-polybutene formulation with a slight amount of anthroquinone added as an antioxidant. The capacitors were placed into the impregnating tank and left at atmospheric pressure and ambient temperature of 265° F for 1 hr. A vacuum of less than 1 mm Hg was produced for 15 min and then released, and the capacitors remained under atmospheric pressure at 265° F for 5 hr. The insulation resistance of the impregnant was well within limits. (See also PB 160 772)

PB 160 774 $4.60

Western Electric Co., Inc., Winston-Salem, N. C.
INDUSTRIAL PREPAREDNESS STUDY. LACQUER FILM CAPACITORS, by E. J. Dennard. Quarterly progress rept. no. 7, 25 Aug-25 Nov 60, on Contract DA 36-039-sc-81268. [1960] 47p. AD-248 438.

DESCRIPTORS: *Capacitors, Coatings, *Manufacturing methods, Cellulose acetates, Acetates, Industrial production, Test equipment, Thin films.

Effort was directed toward the final prove-in of production and testing equipment and manufacture of sample capacitors. Additional refinements to production and testing equipment were incorporated, and techniques were generally improved. As a result, several lots of capacitors were produced in which a relatively high percentage meet all requirements. Test data shows promise of continued improvement. Analysis of product and technique is continuing. (Author) (See also PB 160 773)

PB 160 825 $6.60

Westinghouse Electric Corp., Elmira, N. Y.
HIGH TEMPERATURE MATCH-BOX ELECTRON TUBES, by C. F. Miller. Final rept. for 1 June 58-30 Nov 59, on Contract DA 36-039-sc-75076. [1959] 70p. AD-232 770.

DESCRIPTORS: *Electron tubes, Structures, Temperature, High temperature research, Design, *Glass, Glass seals, *Materials, *Processing.

PB 160 797 $7.60

Speer Carbon Co., Niagara Falls, N. Y.
STUDIES ON LOW CONDUCTIVITY, HIGH STABILITY, SEMICONDUCTOR FILM RESISTORS, by F. M. Collins. Final rept. for July 59-Sep 60, on Contract DA 36-039-sc-78963. [1960] 72p. 22 refs. AD-251 654.

DESCRIPTORS: *Semiconducting films, Thin films, *Resistors, Silicon, Boron, Germanium, Intermetallic compounds, Stability, Heat treatment, Electrical properties, X-ray diffraction analysis, Vapor plating

A literature survey indicated that films of silicon and germanium offered possible but as yet untested advantages as stable resistive elements. An experimental investigation, primarily of silicon films, was therefore undertaken. A device for the vacuum evaporation of elemental silicon was prepared, utilizing a carbon resistance heating element and crucible of boron nitride. The effect of the quartz substrate temperature, in a range up to 1000°C on the character of the film was studied. The effects of variation of processing conditions such as source-to-substrate distance, vacuum level, degassing period, etc., were explored. Postdeposition annealing of the silicon films in various atmospheres and at different temperatures was studied and found to affect the resistivity, T. C. R., and X-ray pattern in a manner resembling that of substrate temperature. The oven stability, humidity stability, and voltage stability of a number of the low-resistivity (0.02 ohm-cm) films were found to vary but were excellent in many cases. A strong influence of substrate material on resistivity and T. C. R. was demonstrated to be associated primarily with the surface roughness of the substrate specimen. Films of germanium, vacuum deposited on fused quartz at different temperatures, exhibited similar variations of resistivity, T. C. R., and X-ray structure as did the silicon films, except for an overall shift of corresponding values to lower substrate temperatures. (See also PB 160 796-4)

AD-275 635 $11.00

Stanford Electronics Labs., Stanford U., Calif.
ELECTRON DEVICES RESEARCH. Consolidated quarterly status rept. 1 Oct-31 Dec 61, on Contracts Nonr-225 (24), AF 19(604)5480, AF 49(638)660, AF 33(616)7944, and DA 36-039-sc-85387. [1962] 143p. 65 refs. SEL-62-017.

DESCRIPTORS: *Electron tubes, *Plasma physics, *Masers, *Lasers, *Ruby, *Microwave amplifiers, Parametric amplifiers, Backward-wave amplifiers, Theory, *Microwave equipment, Ion beams, Electron beams, Electron guns, Noise, Traveling wave tubes, Broadband, *Solid state physics, *Infrared radiation, *Microwaves, Materials, Ions, *Optics, Semiconductors, Lattices, Light, Modulation, Solids, Scientific research, Diodes.

Depressed collector studies: Stationary non-equilibrium plasmas: Conductivity measurements on a current-carrying plasma: Ion and plasma beam sources: Neutralized charged particle streams: Harmonic pumping in maser materials: Broadband maser amplifiers: Theoretical studies of solid-state masers: General microwave device studies: Investigation of noise in electron guns: Transverse-wave electron-beam tubes: Infrared and submillimeter maser studies: Optical spectra of ions in semiconductors: Microwave spectra of transition-group ions in semiconductor lattices: Microwave light modulation methods: Microwave phototubes and light demodulators: Optical masers materials: Solid-state maser: Broadband tunnel diode amplifiers: Emission of electrons in solids: Utilization of optical masers: Studies of tunnel emission of electrons: Current flow in plasmas: An IF plasma experiment: Plasma backward-wave parametric amplifier: Study of high-power hollow-beam traveling-wave amplifiers. (See also AD-270 818)

PB 160 799 $2.60

Stanford Research Inst., Menlo Park, Calif.
RESEARCH INVESTIGATION OF BEACON-TRACKING ANTENNA PROBLEMS AT WHITE SANDS MISSILE RANGE, by J. B. Chown. Annual progress rept. no. 3, Apr 58-Aug 59, on Contract DA 36-039-sc-71205. Aug 59, 22p. SRI Proj. 1717; AD-226 384.

DESCRIPTORS: *Guided missiles, Test facilities, *Radar tracking, Radar equipment, Tests, *Radar beacons, Airborne, *Guided missile antennas, *Antenna radiation patterns, Measurement, *Target drones, *Radar antennas, *Guided missile tracking systems.

The required radiation pattern for drone trajectories was found to approximate that of a vertical dipole. Proper location of antennas on particular drone aircraft was determined by employing prediction techniques based on geometric optics modified by diffraction considerations. Crystal video receivers provided only marginal system performance at 200 naut mi and 40,000 ft. Study indicates that the notch and turnstile antennas will provide uninterrupted tracking up to burn-out, and that any of several antenna arrays (eg: a pair of crossed slots) will provide uninterrupted tracking from burn-out to impact when operated with some type of beacon-transmission diversity system. The use of superheterodyne receivers at 175 naut mi maximum altitude is essential. Studies indicated that the ground diversity system (multi-station tracking) is the most logical diversity scheme. Circular polarization is preferred for the ground radar in order to eliminate any possibility of a complete loss of signal. The forward mounting of antennas on the missile has 2 advantages. First, assuming there is appreciable flame attenuation present, the antenna will enhance the diffraction of energy around the exhaust flame. Second, the nulls produced in the radiation pattern by the fins, usually mounted aft, are as small as possible.

PB 160 788 $5.60

Stanford Research Inst., Menlo Park, Calif.
STUDY OF EFFECTS AND CONTROL OF SURFACE CONTAMINANTS ON ELECTRICAL MATERIALS, by Saul W. Chaikin and Ana Pellecer. Semi-annual technical rept. no. 3 on Contract DA 36-039-sc-74965, continuation of Contract DA 36-039-sc-64454. 15 July 59, 53p. 23 refs. Rept. no. 9; SRI Proj. no. SU-2381; AD-226 122.

A statistical analysis and evaluation of the effect of data-adjustment and decision techniques on the efficiency of midcourse guidance maneuvers are presented. A potentially self-contained optical navigation scheme is hypothesized, and all random measurement errors are considered specified by Gaussian distributions. The basic guidance equations are developed using linear perturbations methods. The nature of the data-adjustment procedure is that the accuracy of terminal prediction improves successively from one guidance point to the next. Guidance logic, based on dead-band and damping decision expressions, further reduces the velocity-increment cost and number of corrections required. (Author)

PB 160 834 $6.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
WAVE-INDUCED MOTIONS OF A ROCKET VEHICLE DRIFTING IN A VERTICAL ATTITUDE, by J. J. Leendertse. Final rept. 31 Jan 61, 61p. 21 refs. Technical note N-402.

DESCRIPTORS: *Rocket research, *Rocket models, *Hydraulic models, *Water waves, Motion, Drift

Results are presented of a theoretical and experimental study in the laboratory of the movements of a large solid-propellant rocket vehicle drifting in a vertical attitude in uniform waves and in the wave environment of the open sea. Measurements were made of the movements in heave and pitch of a 1-to-120 scale model of a million-pound vehicle, 175 feet long and about 12-1/2 feet in diameter. Heave measurements agree well with those calculated; no pitch calculations were made. It appears that heave and pitch are linear functions of wave height and nonlinear functions of wave period. On the basis of the assumption that the response of the vehicle to a sum of uniform waves is equal to the sum of the vehicle responses to the individual components, the frequency of occurrence of certain levels in pitch and heave in ocean-wave environments were calculated. The study indicates that the movements of the vehicle in pitch and heave can be decreased significantly by lowering its flotation chamber and by attaching fins or plates and a weight near its tail end.

PB 160 875 $2.60

Naval Ordnance Lab., White Oak, Md.
PROBLEMS ENCOUNTERED IN THE DEVELOPMENT OF POTTED ELECTRONIC DEVICES FOR A SPECIFIC ORDNANCE APPLICATION, by R. H. Flack and J. O. Mobley. 14 May 56, 27p. 1 ref. NAVORD rept. 4248.

DESCRIPTORS: *Electronic equipment, Encapsulation, *Embedding substances, Plastics, Shock, Temperature, Humidity, Vibration, Countermeasures.

The development of three devices at the Naval Ordnance Laboratory required encapsulation of electronic assemblies for protection against shock and temperature-humidity effects. Partly, at least, due to the fact that these assemblies were somewhat larger than many encapsulated units, the original potting material cracked or caused destruction of the embedded components when subjected to the JAN Temperature-Humidity Test. The 28 day duration of this test and the necessity for providing a satisfactory material in a short time led to a program of simultaneous evaluation of a number of materials which appeared promising in generally similar applications at NOL and elsewhere. Each material was checked for its ability to withstand shock, vibration and temperature-humidity tests. Insulation resistance was measured both before and after temperature-humidity testing. The program eventually encompassed 27 material combinations, two of which proved to have exceptionally good properties for the application at hand. Additional experimentation was necessary to determine methods of applying prepotting protective coatings to certain components, and to select components which would provide suitable ruggedness and stability. (Author)

SCTM-230-61-81 $1.60

Sandia Corp., Albuquerque, N. Mex.
AIRBORNE SPECTRUM ANALYZERS, by B. W. Jordan, Jr. Rept. on Contract AT(29-1)-789. Jan 62, 14p.

TID-15480 $1.10

Sandia Corp., Albuquerque, N. Mex.
LOGIC MODULES FOR SPACE APPLICATIONS, by F. E. Thompson. 19p.

AD-282 406 $0.75

Space Technology Labs., Inc., Redondo Beach, Calif.
SHOCK SPECTRUM MEASUREMENTS, by M. V. Barton and J. M. Lindahl. Preliminary rept. on Plowshare Program, Project Gnome. June 62, 27p. 4 refs. VUP-2401.

DESCRIPTORS: *Nuclear explosions, Blast, Impact shock, Shock waves, Measurement, Explosions.

A total of 12 reed gages were installed for horizontal and vertical displacement shock spectrum measurements on the GNOME event. Seven of the 12 reed gages were placed on the earth's surface at various ranges from surface zero. Four of the gages were placed in the GNOME tunnel. One gage was placed in the International Minerals and Chemical Corporation Mine (Shaft No. 4) approximately 9 miles from the GNOME site. Usable data were obtained from 9 of the 10 records recovered to date. The gage in the IMC mine recorded no displacements. Records from the gages in tunnel nearest zero have not been recovered. (Author)

PB 181 384 $2.00

Space Technology Labs., Inc., Redondo Beach, Calif.
TECHNIQUES FOR ANALYSIS OF NONLINEAR ATTITUDE CONTROL SYSTEMS FOR SPACE VEHICLES. VOLUME III. EXAMPLES OF ANALYTICAL DESIGN OF SPACECRAFT ATTITUDE CONTROL SYSTEMS, by E. I. Ergin, V. D. Norum, and T. G. Windeknecht. Final rept. on Contract AD 33(616)7811. June 62, 77p. Rept. no. 8982-6001-RU-000; ASD TDR-62-208, Vol. III.

Envelopes made of Pyroceram No. 9606 are described and their use for vacuum tubes is outlined. The material's commercial advantages are given; also some aspects of the process of manufacture. Permeability curves are furnished for argon, hydrogen, forming gas and nitroger also for helium and air of Pyroceram No. 9606, No. 7740 glass, No. 1720 glass and 9% alumina. A complete envelope has also been evaluated for permeability to helium and air. Data are furnished on electrical and physical characteristics of this material, also radiation resistance, resistance to weathering and release of gases. Experience gained in the use of amorphous and crystalline solder glass for joining Pyroceram is discussed and methods of application of solder glasses are described. The requirements for lead wires of high temperature components are discussed and the final choice of low carbon nickel as an outer lead and tungsten as a lead for the seal area is supported. Methods of preparation for the leads are furnished. Processing of the final assemblies, yields and the results of various tests made are reported; also performance at an ambient temperature of 400°C and 500°C. (Author)

Ordnance, Missiles, and Satellite Vehicles

AD-282 271 $3.00

ARINC Research Corp., Washington, D. C.
THE ALLOCATION OF SYSTEM RELIABILITY. VOLUME I. DEVELOPMENT OF PROCEDURES FOR RELIABILITY ALLOCATION AND TESTING, by Harold S. Balaban and Hal R. Jeffers. Final rept. 1 July 60-30 Nov 61, on Contract AF 33(616)7468. June 62, 180p. Rept. no. 152-2-274, v. 1; ASD TDR-62-20, Vol. I.

DESCRIPTORS: *Reliability, Feasibility studies, Failure (Mechanics), Specifications, *Mathematical prediction, *Weapons, Scheduling.

Methods for allocating a system reliability requirement to subsystem and lower levels were investigated for four basic system types; serial, modified-serial, redundant and bimodal. An allocation model is presented for determining unit (component, equipment or subsystem) reliability requirements based on such factors as feasibility of the overall system requirement, unit/system failure relationships, unit or functional capability, relative unit state-of-the-art, duty cycles, and gross unit environment. The input data required by the model together with means for determining compliance to the allocated requirements through reliability or life tests are also discussed in detail. (Author)
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Committee on Aeronautical and Space Sciences, United States Senate, Eighty-Seventh Congress, Second Session.
SOVIET SPACE PROGRAMS: ORGANIZATION, PLANS, GOALS, AND INTERNATIONAL IMPLICATIONS, ed. by Glenn P. Wilson. Staff rept. 31 May 62, 399p.

DESCRIPTORS: *Astronautics, Science, Technological intelligence, Education, Scientific personnel, Personnel, Satellite vehicles, Satellite vehicle research, Guided missiles, Military requirements, Communication systems, Rocket motors, Nuclear propulsion, Propulsion, Manned, Space flight, USSR

The Library of Congress has prepared a report on Soviet intentions, organizations, plans, and programs in space, and on the international implications of the Soviet space program. The report is divided into three parts: a survey of science in the Soviet Union; Soviet science in space; and implications of the USSR's space activities for international cooperation and law. The report provides a descriptive account of Soviet science and technology, an estimate of the organizational structure of the Soviet space program, a review of Soviet achievements in space, and analysis of Soviet attitude about international cooperation in space and international space law. (NASA abstract)

PB 160 782 $8.10

Institute for the Study of Rate Processes, U. of Utah, Salt Lake City.
FUNDAMENTAL INVESTIGATION OF AIR BLAST AND GROUND SHOCK, by H. J. Allen, D. H. Pack and others Technical rept. II (Annual rept. no. 1) on Contract DA 04-495-ORD-674. 1 Apr 57, 85p. 19 refs. AD-135 694.

DESCRIPTORS: *Explosions, Blast, *Air blast, Meteorology, *Shock waves, Propagation.

A report is made of the investigation of damage and noise caused by air blast and ground shock. The investigation includes (1) study of the variables and conditions affecting the propagation of air and ground shock waves over long distances, (2) examination of systems used to forecast the strength of a blast wave from a given explosive charge at long distances from the charge center, and (3) examination of the effect of air and ground blast waves on various types of structures.

AD-275 277 repriced $2.25

Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
BIBLIOGRAPHY OF REPORTS ON DATA ACQUISITION INSTRUMENTATION. May 62, 80p. Document no. 101-62.

DESCRIPTORS: *Bibliography, *Reports, *Instrumentation, Data, Reduction, Mathematical analysis, Least squares method, *Tracking, Radar equipment, *Radar tracking, Doppler radar, Doppler systems, *Doppler tracking, *Optical tracking, Optical equipment, Position finding, Underwater equipment, Aerial cameras, Ballistic cameras, Theodolites, Guided missiles, Guided missile trajectories, Detection.

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Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
A STUDY OF STATISTICAL DATA-ADJUSTMENT AND LOGIC TECHNIQUES AS APPLIED TO THE INTERPLANETARY MIDCOURSE GUIDANCE PROBLEM, by Alan L. Friedlander and David P. Harry, III. 1961, 28p. 14 refs. NASA Technical rept. R-113.

DESCRIPTORS: *Space navigation, *Celestial guidance, *Space flight, Control simulators, Digital computers, Errors, Spaceships, Perturbation theory, *Orbital flight paths, Statistical analysis, Mathematical logic.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

Engines and Propulsion Systems

AD-281 794 $2.50

Armour Research Foundation, Chicago, Ill.
STUDY OF THE MECHANISM OF FAILURE OF ROCKET MATERIALS AND MATERIALS RESEARCH, by Y. Baskin, D. C. Schell, and W. K. Sumida. Final rept. 15 Mar 60-15 Dec 61, on Refractory Inorganic Non-Metallic Materials, Contract AF 33(616)7048. May 62, 112p. 13 refs. ASD-TDR-62-314.

DESCRIPTORS: *Rocket motor nozzles, Rocket motors, Solid rocket propellants, *Refractory materials, *Graphite, Ceramic fibers, *Ablation, Microstructure, *Carbides, *Zirconium compounds, Shock resistance, Tantalum, Tungsten, Metals, Reinforcing materials, Heat resistant alloys, *Failure (Mechanics), Oxides, *Thorium compounds

Rocket failure mechanisms in conjunction with the development of nozzle materials for solid propellant motors is discussed. Testing graphite in an oxy-acetylene torch and the effects of purity, density, orientation, and microstructure on erosion-resistance were evaluated. Erosion decreased with greater purity. New graphite materials were developed and evaluated including hot pressed compositions and impregnated bodies. Suitability of ZrC as a nozzle material was evaluated. Incorporation of Ta and W fibers in ZrC results in considerable improvement in resistance to thermal spalling although not sufficient to prevent cracking. Thoria-base bodies reinforced with W fibers were studied. Ten promising materials were fabricated into rocket nozzles and tested in static motor stands. Erosion performance is presented along with analysis of failure mechanisms. (Author)

GAMD-1722 $3.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
DESIGN OBJECTIVES FOR THE MARITIME GAS COOLED REACTOR LAND BASED PROTOTYPE, by J. D. Messersmith, W. C. Moore and H. N. Wellhouser. Rept. on Contract AT(04-3)-187. 29 Mar 62, 39p. 12 refs.

Order from GPO $0.65 as NAS 1.12:111

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
THEORETICAL PERFORMANCE OF HYDROGEN-OXYGEN ROCKET THRUST CHAMBERS, by Gilbert K. Sievers, William A Tomazic, and George R. Kinney. 1961, 75p. NASA Technical rept. R-111.

DESCRIPTORS: Rocket motors, Liquid rocket propellants, *Hydrogen, *Oxygen, *Liquefied gases, Combustion chambers, *Specific impulse, Rocket motor nozzles, Theory, Pressure, Nozzles, Velocity, Fluid flow, Rocket propulsion.

Data are presented for liquid-hydrogen-liquid-oxygen thrust chambers at chamber pressures from 15 to 1200 pounds per square inch absolute, area ratios to approximately 300, and percent fuel from about 8 to 34 for both equilibrium and frozen composition during expansion. Specific impulse in vacuum, specific impulse, combustion-chamber temperature, nozzle-exit temperature, characteristic velocity, and the ratio of chamber-to-nozzle-exit pressure are included. The data are presented in convenient graphical forms to allow quick calculation of theoretical nozzle performance with over-or under-expansion, flow separation, and introduction of the propellants at various initial conditions or heat loss from the combustion chamber. (Author)

PB 160 833 $16.50

Pennsylvania State U., University Park.
LOW TEMPERATURE STARTING AND OPERATION OF COMPRESSION IGNITER ENGINES. A SURVEY AND BIBLIOGRAPHY, by W. E. Meyer. Rept. on Contract DA 36-061-ORD-610. 31 Oct 59, 257p. 289 refs. AD-232 595.

DESCRIPTORS: *Internal combustion engines, Ignition, Starting, Bibliography, Diesel engines, Military equipment.

The problems of low-temperature starting and operation of compression ignition engines, particularly those with multifuel capability, are reviewed. An annotated bibliography containing 291 references is presented, supplemented by a subject index with notations on the contents and significance of the more important references. The references in the subject index are listed with P- or G- numbers to indicate those published in professional and trade journals and those by government agencies or contractors, respectively. Translations of the following 5 papers are appended: (1) Thermal processes in the cylinder of a diesel engine during starting, by Hermann Baeumier (MTZ 18:61-64, 1957); (2) Electric glow plugs as starting aid for diesel engines, by H. J. Brosinsky (MTZ 19:33-40, 1958); (3) Cranking time of automotive diesel engines as a function of ambient temperature, by H. J. Conrad (Kraftfahrtforschung 55:43-77, 1941); (4) Influence of engine speed on the conditions for autoignition in starting of diesel engines, by F. Schaub (Kraftfahrtforschung 55:21-42, 1941); and (5) The influence of aids on the starting performance of a high speed, open-chamber diesel engine, by G. von Bennigsen (MTZ 19:175-181, 1958).

MATERIALS

PB 160 781 $7.60

Armour Research Foundation, Chicago, Ill.
COATINGS FOR THE REFLECTION OF INTENSE THERMAL RADIATION, by Edwin H. Tompkins and Victor R. Ivanuski. Final rept. 20 Nov 58-20 Feb 60, on Contract DA 11-022-509-ORD-2932. 19 Feb 60, 74p. 5 refs. Rept. no. ARF 3141-15.

DESCRIPTORS: *Coatings, Reflection, *Paints, *Reflectors, Pigments, Thermal radiation, Oxides.

DESCRIPTORS: *Spaceships, *Control systems, *Nonlinear systems, *Non-linear differential equations, *Flight attitude indicators, Analysis

This four volume report was prepared in order to compile, describe, and apply the available nonlinear analysis and design techniques for space vehicle attitude control systems and to outline additional areas of future effort to improve present analysis and design procedures. Volume III discusses three general problems in space vehicle attitude control systems, (1) single axis on-off gas jet system design, (2) active attitude control system design for a spin-stabilized vehicle, and (3) the design of control system for a satellite vehicle with reaction wheels and gas jets. (See also AD-282 805)

AD-282 805 $5.00

Space Technology Labs., Inc., Redondo Beach, Calif.
TECHNIQUES FOR ANALYSIS OF NONLINEAR ATTITUDE CONTROL SYSTEMS FOR SPACE VEHICLES. VOLUME II. TECHNIQUES FOR ANALYSIS AND SYNTHESIS OF NONLINEAR CONTROL SYSTEMS, by E. I. Ergin, V. D. Norum, and Windeknecht. Final rept. on Contract AF 33(616)7811. June 62, 315p. Rept. no. 8982-6001-RU-000; ASD TDR-62-208, v. 2.

DESCRIPTORS: *Spaceships, Control systems, Nonlinear systems, Nonlinear differential equations, Flight attitude indicators, Analysis, Synthesis

This four volume report was prepared in order to compile, describe, and apply the available nonlinear analysis and design techniques for space vehicle attitude control systems and to outline additional areas of future effort to improve present analysis and design procedures. Volume II treats in detail the principal techniques for the analysis of nonlinear control systems and shows the application of these techniques to specific attitude control system problems.

AD-282 057 $2.00

Space Technology Labs., Inc., Redondo Beach, Calif.
TECHNIQUES FOR ANALYSIS OF NONLINEAR ATTITUDE CONTROL SYSTEMS FOR SPACE VEHICLES. VOLUME IV: REFERENCES AND BIBLIOGRAPHY, by E. I. Ergin, V. D. Norum, and T. G. Windeknecht. Final rept. on Contract AF 33(616)7811. June 62, 74p. 369 refs. ASD-TDR-62-208, Vol. IV.

DESCRIPTORS: *Spaceships, *Control systems, *Nonlinear systems, Non-linear differential equations, Flight attitude indicators, Analysis, *Bibliography

This four volume report was prepared in order to compile, describe, and apply the available nonlinear analysis and design techniques for space vehicle attitude control systems and to outline additional areas of future effort to improve present analysis and design procedures. Volume IV is a collection of references and bibliography with annotations and comments covering the spectrum of the study effort.

(See also AD-282 706)

Sanitation and Safety Engineering

DLCS-5020100 $12.00

Duquesne Light Co., Shippingport, Pa.
EMERGENCY PLAN. [1962] 165p.

TEI-810 $11.00

Geological Survey, Washington, D. C.
POTENTIAL EFFECTS OF PROJECT CHARIOT ON LOCAL WATER SUPPLIES, by Arthur M. Piper. Nov 61, 142p.

PPAD-457D $1.10

Princeton-Pennsylvania Accelerator, Princeton U., N. J.
DESIGN GUIDE AND RULES FOR HYDROGEN SAFETY, by N. Oser, T. Bowen, and others. Rept. on Contract AT(30-1)-2137. 1 May 62, 10p.

Order from GPO $0.30 as
FS 2.2W29/30

Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
EFFECTIVENESS OF WATER TREATMENT PROCESSES AS MEASURED BY COLIFORM REDUCTION. PART I: WATER TREATMENT DATA. PART II: SPECIAL COOPERATIVE MF-MPN STUDY, by Graham Walton. 1961, 68p. 23 refs. PHS Publication no. 898.

DESCRIPTORS: *Sanitary engineering, *Water, Water supplies, Purification, Chlorination, Sand, Separation, Disinfectants, Coagulation, Sedimentation, *Bacteria, Reduction, Effectiveness.

PB 160 881 $4.60

Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
WATER CONTAMINATION IN FALLOUT AREAS, by Gordon G. Robeck, Richard L. Woodward, and William K. Muschler. Technical note on Contract AF 29(601)56-1836. May 58, 47p. 1 ref. AFSWC-TN-59-1.

DESCRIPTORS: *Water supplies, *Contamination, Radioactive fall-out, *Radiological contamination

An evaluation of the potential radiological hazard to Air Force personnel from drinking water contaminated with fission products is presented. Ground water supplies should be safe from fallout contamination and only surface supplies may need special treatment. Even in untreated water, the radioactivity in surface supplies is not likely to reduce significantly the military effectiveness of personnel using it except where the general level of contamination is greater than 1000 r/hr at H + 1.

measurements show that the heat capacities of molybdenum and tantalum gradually rise above their Dulong and Petit values of 0.06253 and 0.03316 cal/gm/°C, respectively, at high temperatures. AT 2800 °K, c_p (Mo) = 0.1350 cal/gm/°C and at 3200 °K, c_p (Ta) = 0.0667 cal/gm/°C. These anomalies have been noted in other transition metals. The percentage elongation, relative to room temperature, of zirconium carbide has been measured between 1000 and 2000°C and was found to vary linearly from 0.6% at 1000°C to 1.6% at 2300°C with a permanent set occurring above 2300°C. A transient method for measuring thermal diffusivity, specific heat, and thermal conductivity of insulators as well as conductors has been under development for the temperature range 20°C to 2500°C. (Author)

TID-16030 $3.60

Denver Research Inst., Colo.
INTERMEDIATE TEMPERATURE OXIDATION OF BERYLLIDES, by Frank C. Perkins. Quarterly progress rept. on Contract AT(11-1)-1092. 8 Mar 62, 32p. 7 refs. DRI 2031.

AD-278 806 $1.00

Directorate of Materials and Processes, Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
GROWTH AND ANALYSIS OF ALUMINA "WHISKERS", by C. T. Lynch, F. W. Vahldiek, and L. B. Robinson. Final rept. Aug 60-Sep 61, on Refractory Inorganic Nonmetallic Materials. May 62, 40p. 59 refs. ASD-TDR-62-272.

DESCRIPTORS: *Aluminum compounds, *Oxides, High temperature research, Growth, Argon, Helium, Hydrogen, X-ray diffraction analysis, Refractory materials, Spectrographic analysis, Chemical analysis, Impurities, Crystals, Ceramic fibers.

Alumina whiskers were grown at 1700° to 1800°C in argon and helium atmospheres containing small amounts of hydrogen. Whiskers thus produced were analyzed by X-ray diffraction, by spectrographic emission, and by wet chemical methods. A scheme was developed for establishing impurity levels in the whiskers. Conditions conducive to growth were investigated, as well as characteristics of whisker growths. Some whiskers which possess unusually complex dendritic growth patterns were examined in considerable detail, and evidence was found of several distinct types of growth forms. A simple tube furnace apparatus for whisker growth is described. (Author)

DC-61-6-4 $1.10

General Electric Co., Cincinnati, Ohio.
SUMMARY OF THERMAL EXPANSION AND THERMAL CONDUCTIVITY MEASUREMENTS, by E. S. Fitzsimmons. Preliminary rept. on Contract AT(11-1)-171. May 61, 9p. 1 ref.

AD-278 826 $1.25

Little, Arthur D., Inc., Cambridge, Mass.
KINETICS OF OXIDATION IN THE Mo-Si SYSTEM, by Joan B. Berkowitz. Final rept. Sep 60-Sep 61, on Refractory, Inorganic and Non-Metallic Materials, Contract AF 33(616)6154. May 62, 48p. 28 refs. ASD-TDR-62-203, Part 1.

DESCRIPTORS: Refractory materials, *Oxidation inhibitors, *Molybdenum, *Molybdenum compounds, *Silicides, High temperature research, Oxygen consumption, Silicon, Vaporization, Behavior, Thermal conductivity, Metals, Gas diffusion, Oxides, Films, Coatings, Dioxides, Silicon compounds, Boundary layer

The oxidation behavior of Mo, Mo_3Si, Mo_5Si_3, and $MoSi_2$ has been studied at temperatures between 1000° and 1725°C at oxygen partial pressures less than 20 mm. Pure molybdenum metal oxidizes linearly in this range, with a ratio constant

$$k = k_o \, e^{-22,000/RT} p^{0.87},$$

where p is oxygen partial pressure, the gas constant R is in cal/mole, T is °K and k_o is a constant independent of temperature and pressure. To a good approximation, oxidation of the molybdenum silicides follows a logarithmic rate, $Q = Q_o(1-e^{-\alpha t})$, where Q is the total oxygen consumed between time zero and time t, while Q_o and α are constants, dependent upon composition, pressure, and temperature. In general, for a given silicide composition, Q_o decreases and α increases with increasing temperature 1300° and 2000°K, at a constant oxygen pressure. At any fixed temperature, the most oxidation resistant material is $MoSi_2$; Mo_5Si_3 is oxidized to a larger extent before a protective coating is established, and Mo_3Si is oxidized still more extensively. It is significant, however, that the rates of oxidation of all three compounds eventually reaches a low-limiting value. Metallographic examination of the oxidized samples has established that oxidation proceeds at least in part by diffusion of oxygen inward. (Author)

TIM-410 $2.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
THE THERMAL EXPANSION OF ELEVEN TUNGSTEN CARBIDE CERMETS, KENNAMETALS, K-3H, K-8, K-10, K-11, K-21, K-QO, K-91, K-92, K-94, K-95, AND K-96, by L. C. Harrington. 20 May 57, 24p.

Fuels, Lubricants, and Hydraulic Fluids

AD-281 818 $3.00

Allied Chemical Corp., Morristown, N. J.
RESEARCH ON MATERIALS AND METHODS FOR DECONTAMINATION OF TOXIC MISSILE PROPELLANT SPILLAGE, by J. M. Siegmund, R. B. Jackson and others. Rept. for Jan-Dec 61 on Toxic Hazards of Propellants and Materials, Contract AF 33(616)7672. June 62, 186p. 42 refs. ASD TDR-62-64.

Parameters which determine the reflectivity of white paint coatings have been studied experimentally in detail. High degrees of pigment dispersion have been shown to be necessary for high reflectivities in the violet end of the visible spectrum. Porosity in a paint coating reduces reflectivity unless it is introduced by means of an extremely finely porous material, such as a purified diatomaceous earth. Overcoatings of magnesium oxide or other similar materials on rutile or anatase coatings do not significantly decrease the absorption of the ultraviolet. Rutile and anatase coatings are essentially black in the ultraviolet. Pigmented ceramic coatings reflect the near infrared better than organic paint coatings. Even the slightest yellow or straw color in a pigment or vehicle shows up as a pronounced absorption in the violet end of the visible spectrum. The best coatings for wide-spectrum reflection we have prepared contain pure magnesium oxide upgraded with bleached diatomaceous earth and thoroughly dispersed in a colorless silicone. (Author)

PB 160 836 $3.60

Industrial Test Lab., Philadelphia Naval Shipyard, Pa.
PAPER WIPING TOWELS FOR MACHINERY, DEVELOPMENT AND SPECIFICATIONS FOR, by E. H. Wadlinger and H. A. Kline. 26 Mar 56, 31p. 1 ref. Specification-Development rept. no. 2888; AD-90 301.

DESCRIPTORS: *Wiping cloths, *Paper, Machines, Tests, Standards, Cleaning.

Two brands of paper wipers intended for machine wiping and similar uses have been subjected to tests and a proposed specification for such materials has been developed. The test data and a draft of the proposed specification are included in the report. (Author)

AD-282 935 $0.50

Naval Civil Engineering Lab., Port Hueneme, Calif..
REMOVAL OF ASPHALT FROM DRUMS, by C. A. Scharpf, J. H. Sams, and J. S. Williams. 29 June 62, 16p. Technical rept. R-205.

DESCRIPTORS: *Asphalt, Adhesion, *Containers, Release mechanisms, Immersion heaters, Silicones, Cellulose, Bentonite.

Two methods of removing asphalt from drums have been developed which promise to be superior to present methods. (1) The inside of the drums is coated with a chemical release agent to allow the cut drums to be stripped from the asphalt. (2) The drum is immersed briefly in hot water to allow the slug to slide out. (Author)

AD-282 795 $1.50

Plastics Technical Evaluation Center, Picatinny Arsenal, Dover, N. J.
SUBJECT INDEX, BIBLIOGRAPHY, AND CODE DESCRIPTION OF TECHNICAL CONFERENCE PAPERS ON PLASTICS, 15 FEBRUARY 1961-23 FEBRUARY 1962, by Arnold E. Molzon. June 62, 61p. 930 refs. PLASTEC rept. 11.

DESCRIPTORS: *Plastics, Bibliography, Conferences, Materials, Indexes, Polymers, Physical properties, Mechanical properties

The papers presented at the technical conferences on plastic materials and related technology, within a 1-year period ending 23 February 1962, have been listed and indexed by subject. Over 400 papers from 10 conferences are covered. This report serves as a guide to the subjects presented, and by means of a numerical code system, it tells the reader what type of information each article contains. Included are a bibliography and lists of references thereto, on plastic materials and technical data. (See also AD-264 775)

AD-281 811 $2.00

Syracuse U. Research Inst., N. Y.
THE EFFECT OF STRESS GRADIENT AND STRESS BIAXIALITY ON THE BEHAVIOR OF MATERIALS, by Volker Weiss, John Sessler, and Kushwant Grewal. Rept. for 15 Oct 60-15 Oct 61 on Refractory Inorganic Non-Metallic Materials, Contract AF 33(616)7609. May 62, 74p. 13 refs. ASD TR-61-725.

DESCRIPTORS: Materials, *Brittle materials, *Ceramic materials, *Metals, Titanium alloys, *Refractory materials, *Stresses, Plasticity, Statistical analysis.

The effects of stress gradient and stress biaxiality on the notch strength of brittle, semi-brittle and semi-ductile materials were investigated. The experimental results obtained on a nearly ideally brittle titanium alloy are in agreement with the predictions of a fracture concept based on Neuber's theory of notch stresses. Accordingly the stress concentration factor is the dominant parameter which affects the notch strength. The magnitude of the stress gradient and stress biaxiality at the notch root has a secondary effect in that the notch strength of brittle materials is reduced with decreasing gradient and increasing biaxiality. The notch strength behavior of brittle ceramics has to be interpreted in terms of the inhomogeneity of these materials. Weibull's statistical theory of fracture was applied to this problem.

Ceramics and Refractories

PB 160 804 $2.60

Atomics International, Canoga Park, Calif.
THERMAL PROPERTIES OF REFRACTORY MATERIALS, by Guy W. Lehman. Rept. for Nov 59-July 60, on Materials Thermal Properties, Contract AF 33(616)6794. July 60, 29p. WADD-TR-60-581; ARPA Order 24-59; AD-247 411.

DESCRIPTORS: *Refractory materials, *High temperature research, Specific heat, Measurement, Heat transfer, *Metals, Thermal diffusion, Carbides, Copper, Iron, Molybdenum, Tantalum, Rhenium.

A pulse heating method for measuring the specific heat of conductors from near absolute zero to their melting point is described. Results obtained on copper, iron, molybdenum, tantalum, and rhenium are reported here and indicate that the pulsed heating method gives specific heat data accurate to a few percent. Our

MATHEMATICS

OTS SB-485 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
MATRIX ALGEBRA. APPLICATIONS. Dec 61, 9p. 100 refs. OTS Selective Bibliography SB-485.

DESCRIPTORS: *Matrix algebra, Applied mathematics, Mathematics, *Bibliography

Lists 100 references to reports added to the OTS collection during 1961, which illustrate the use of matrix algebra in mathematical analysis in scientific investigation in a variety of subjects including communications, electrical networks, electronics, infrared research, guided missiles, mathematical statics, plasma physics, vibration, economics and sociology, among others. (Author)

NYO-10134 $1.60

Rochester U., N. Y.
A CLASS OF SOLVABLE POTENTIALS, by A. Bhattacharjie and E. C. G. Sudarshan. Rept. on Contract AT(30-1)-875. 18 Apr 62, 20p. 6 refs.

AD-275 896 $2.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
UNIQUENESS AND EXISTENCE OF THE SOLUTION TO THE STATIC LONDON-MAXWELL EQUATIONS IN TWO DIMENSIONS, by Farouk Odeh. Rept. on Contract Nonr-3504(00). 8 Mar 62, 23p. 5 refs. Research paper RC-646.

DESCRIPTORS: *Superconductivity, *Harmonic analysis, *Functional analysis, Bessel functions, Integral equations, Operators (Mathematics), Partial differential equations

A theorem is given for the existence and uniqueness of the time-independent solution of the exterior-interior problem associated with determining the distribution of superconducting current, according to the London model, in simply or doubly-connected two-dimensional regions. The proof of the corresponding theorem in three-dimensions is outlined. A discussion is also given of the relationship between two "different" solutions which already exist for rectangular regions. (Author)

Computing Devices

PB 160 822 $26.00

Army Signal Research and Development Lab., Fort Monmouth, N. J.
TABLES OF BINARY QUANTIZED EQUIVALENTS FOR ELECTRONIC DIGITAL DATA TRANSMISSION SYSTEMS, by Erwin Biser, Harvey Eisenberg and others. 19 May 59, 549p. ASRDL Technical rept. no. 2028; AD-234 281.

DESCRIPTORS: Tables, Functions, *Digital computers, *Data transmission systems, Circuits, *Mathematical computer data

The needs of our country and the advancements in electronics have produced complex defense systems. These defense systems involve such equipment as data links, electronic digital computers, data processing equipment, analog-to-digital conversion subsystems, digital transmission systems, etc. Because there is a need for an easy method of checking the output of the complex equipment, a set of binary quantized equivalent tables was conceived and developed. These tables are being published as part of the internal research and development effort of this laboratory. The tables give, in decimal and binary quantized form, the rectangular coordinates of 1620 points in space. These tables also have an introduction, which gives the theoretical background necessary for a complete understanding of the development of the tables, and instructions on their use. These tables have a wide range of application. (Author)

AD-282 524 $0.50

Diamond Ordnance Fuze Labs., Washington, D. C.
MULTIPLE INTEGRATIONS ON A REAL-TIME ANALOG COMPUTER, by Arthur Hausner. 30 July 62, 20p. 3 refs. TR-1046.

DESCRIPTORS: *Analog computers, Integration, Computers, Integrals.

Techniques are presented for evaluating integrals of the type

$$I = \int_a^b \int_{y_1(x)}^{y_2(x)} f(x,y)\, dy dx$$

on a real-time analog computer. Extensions to higher order integrals are made and other uses of these techniques are discussed. The emphasis is placed on using components generally available in real-time computers. However, the formulas derived suggest that the use of the techniques presented are preferable even when a repetitive computer with memory is available. (Author)

TID-16238 $4.60

Digital Computer Lab., U. of Illinois, Urbana.
TECHNICAL PROGRESS REPORT. PART I. CIRCUIT RESEARCH PROGRAM. PART II. ILLIAC USE AND OPERATION. PART III. IBM 650 USE AND OPERATION. PART IV. INSTRUCTIONAL USE OF COMPUTERS. PART V. CONTROL DATA CORPORATION 1604. PART VI. 7090-1401 COMPUTING SYSTEM. PART VII. GENERAL LABORATORY INFORMATION. Apr 62, 48p.

DLCS 4000301 $8.10

Duquesne Light Co., Shippingport, Pa.
AUTOMATIC DATA LOGGING AND COMPUTING SYSTEM CALIBRATION TEST. [1962] 83p.

DC-61-6-9 $6.60

General Electric Co., Cincinnati, Ohio.
ANP PROGRAM NO. 334: A FOLDED FLOW SENSITIVITY STUDY, by J. A. Delaney. Preliminary rept. on Contract AT(11-1)-171. 31 May 61, 62p. 3 refs.

DESCRIPTORS: *Rocket propellants, *Decontamination, *Nitrogen compounds, Tetroxides, *Chlorine compounds, Fluorides, *Hydrazines, Methyl hydrazines, *Pentaboranes, *Ammonia, *Liquid rocket propellants, *Hazards, Toxicity.

Decontaminants for five toxic missile propellants; nitrogen tetroxide, chlorine trifluoride, hydrazine, unsymmetrical dimethylhydrazine, and pentaborane, were considered. The work for each propellant is divided into: the practical phase which includes a comprehensive literature survey; the theoretical phase includes a study of possible chemical reactions with respect to probable effectiveness, nature of end products, and heats involved; the laboratory phase where the candidate materials were tested for their neutralizing capability with the various propellants. The most effective decontaminant for each propellant was developed based on this work; however, if a common decontaminant for all five propellants is required, dilute aqueous solutions of ammonia appear to offer the best potential. (Author)

PB 160 828 $2.60

Army Rocket and Guided Missile Agency, Redstone Arsenal, Ala.
DETERMINATION OF FERRIC OXIDE, ALUMINUM, AND MAGNESIUM OXIDE IN POLYSULFIDE PROPELLANTS, by William H. Howard and Bernard J. Alley. 25 Feb 60, 22p. 7 refs. Rept. no. ARGMA TR 1D2R; AD-233 954.

DESCRIPTORS: *Solid rocket propellants, Chemical analysis, Sulfides, Polymers, Iron compounds, Magnesium compounds, Oxides, Determination, Ethylenedinitrilo tetraacetates, Quality control, Aluminum.

Procedures have been developed for the rapid determination of ferric oxide, aluminum, and magnesium oxide in polysulfide propellants. The procedures are based on the selective complexing action of disodium (ethylenedinitrilo) tetraacetate (EDTA) at specific pH values. Ferric oxide and aluminum are determined in the presence of each other; a separate propellant sample is analyzed for magnesium oxide after the removal of iron and aluminum as the hydrous oxides. Analyses are accurate to within 2 to 3 percent of the constituent concentration at the 1 percent level. Propellants in any state of curing can be analyzed and results are essentially independent of reactions which occur during mixing and curing. (Author)

DC-61-2-4 $2.60

General Electric Co., Cincinnati, Ohio.
MILESTONE I, TASK 434311, JOB 51146, by C. F. Zapf. Preliminary rept. on Contract AT(11-1)-171. 27 Jan 61, 30p. 10 refs.

R60GL185 $3.60

General Engineering Lab., Schenectady, N. Y.
THE ROLE OF SURFACE FILMS IN LUBRICATION, by R. T. Foley and M. B. Peterson. Preliminary rept. on Contract AT(11-1)-171. 31 Oct 60, 40p. 21 refs.

PB 160 832 $1.60

Naval Ordnance Test Station, China Lake, Calif.
COMBUSTION INSTABILITY IN SOLID PROPELLANT ROCKET MOTORS, by E. W. Price. 21 Dec 59, 18p. 10 refs. NAVORD rept. 7023; NOTS TP 2389; AD-239 674.

DESCRIPTORS: Rocket motors, *Solid rocket propellants, Combustion, Stability, Jet acoustic oscillations

New experimental data are cited on the subject of burning rate of solid propellants during high frequency oscillatory combustion. Tests were made on a wide range of double-base and composite propellants totalling about 800 firings on 15 different propellants. The following generalizations relevant to the Green-Nachbar theory (Jet Propulsion 28:769, 1958) were made: (1) burning rate of propellants always increases during oscillatory burning, as indicated by the accompanying increases in pressure; (2) partially burned charges show that the greatest increase in burning rate is in region where the amplitude of the velocity oscillations of the gas is a maximum; (3) the observed increase in burning rate during oscillatory burning exhibits no dramatic dependence on composition of propellant or on frequency of the oscillatory behavior; (4) with mesa-burning double-base propellants, the burning rate decreases during oscillatory burning; and (5) the maximum decrease in burning rate occurs in the region where the amplitude of the tangential velocity oscillation of the gas is a minimum.

PB 160 873 $7.60

Naval Ordnance Test Station, China Lake, Calif.
DESIGN AND TEST OF A RAPID-LOADING UNIVERSAL TESTING MACHINE, by Robert G. Gaumer. 1 Nov 54, 76p. 6 refs. Technical memo. 1082.

DESCRIPTORS: *Rocket propellants, Solid rocket propellants, Loading, Stresses, *Test equipment, Hydraulic systems, Design, Operation

This machine was designed to strain-test specimens in tension or compression at constant cross-head rates up to 400 ips and to provide hydraulic pressures up to 3,000 psi for burst testing at constant rates of loading up to 10^6 psi/sec. The principal parts designed for the machine were a metering piston, an adjustable-orifice valve, and a supporting structure; other components were commercially available. The machine is portable. It is operated by a motor-driven pump, an air booster, hand valves, and suitable electrical equipment. The machine has been tested only at 2,000 psi; and at this operating pressure it produces a piston vel. of 200 ips. Operating instructions, calculations, and BuOrd SK numbers are given for the machine. The fittings for burst testing are not described, but the procedure for such testing is given.

RRC-0101 $8.10

Royal Research Corp., Hayward, Calif.
CESIUM-137 POWER PROGRAM. Quarterly rept. no. 2 on Contract AT(04-3)-366. 31 July 61, 86p.

Functions are tabulated of Mach numbers for a compressible perfect gas. The ratio of specific heats (k) is 1.28. The increment used in these tables is sufficiently small (0.001 Mach number) to eliminate time consuming interpolation. This report covers adiabatic flow in constant-area ducts with friction and is one of a series of reports dealing with five simple types of one-dimensional flow. (Author)

PB 160 792 $8.60

Army Ballistic Missile Agency [Huntsville] Ala.
COMPRESSIBLE FLOW TABLES k = 1.30 ADIABATIC FLOW WITH FRICTION. 1 Mar 61, 94p. 4 refs. Rept. no. RA-TR-7-61; AD-252 458.

DESCRIPTORS: *Adiabatic gas flow, Specific heat, Ducts, Friction, Tables, *Compressible flow.

This report tabulates functions of Mach numbers for a compressible perfect gas. The ratio of specific heats (k) is 1.30. The increment used in these tables is sufficiently small (0.001 Mach number) to eliminate time consuming interpolation. This report covers adiabatic flow in constant area ducts with friction and is one of a series of reports dealing with five simple types of one-dimensional flow. (Author) (See also PB 160 791)

PB 160 815 $6.60

James Forrestal Research Center, Princeton, N. J.
THE CALCULATION OF VELOCITY AND TEMPERATURE PROFILES THROUGH A WEAK NORMAL SHOCK WITH AN EXPANSION IN POWERS OF A SHOCK STRENGTH PARAMETER, by Martin Sichel. Rept. on Contract AF 49(638)465. Nov 59, 68p. Rept. no. 488; AFOSR TN-60-83; AD-233 800.

DESCRIPTORS: *Gas flow, *Shock waves, Theory, Temperature, Viscosity, Velocity, Mathematical analysis, Series.

A series expansion in powers of shock strength was used to solve the Navier Stokes equations for the velocity and temperature profiles of weak shock waves ($M_1 \leq 2$). This series when compared with exact analytical solutions was found to adequately predict the effects of variable Prandtl number and of variable viscosity. The velocity and temperature are expressed directly as functions of position and shock strength. Also discussed is the effect of the Prandtl number and the viscosity-temperature relation on the expansion coefficients. The shock is assumed to occur in a perfect gas with constant specific heats. (Author)

PB 160 830 $5.60

Southampton U. (Gt. Brit.)
A PRELIMINARY STUDY OF IONIC RECOMBINATION OF ARGON IN WIND TUNNEL NOZZLES, by K. N. C. Bray and J. A. Wilson. Technical note no. 2 on Contract AF 61(052)250. Feb 60, 58p. 7 refs. USAA rept. no. 134; ARL TN-60-148; AD-246 452.

DESCRIPTORS: *Gas flow, Atoms, Nozzles, *Gas ionization, Argon, *Wind tunnel nozzles, Great Britain, Conical nozzles.

The theory of the ideal ionising monatomic gas is briefly outlined and a Mollier chart is presented for this gas in equilibrium. Its flow through nearly conical nozzles is considered for cases where ionic recombination is either in complete equilibrium or completely frozen. A discussion is included of conditions under which the ionisation fraction becomes vanishingly small, when the gas behaves as a perfect gas. A useable rate equation was not developed for partial equilibrium calculations, but a method of attempting this problem was suggested for the case of argon. In the absence of a suitable rate equation the quasi-one-dimensional flow equations were not integrated for partial equilibrium cases, but criteria are given for the flow to be near to equilibrium and nearly frozen. If the assumptions made here are correct then these criteria suggest that there may be a lack of ionic equilibrium in the nozzles of plasma-jet wind tunnels when operated at low stagnation pressures. Departure from adiabatic flow due to photon emission is also considered, and shown to be negligible. (Author)

Hydrodynamics, Hydraulics, and Hydrostatics

DC-61-2-76 $1.10

General Electric Co., Cincinnati, Ohio.
A COMPARISON OF MIXED AND STRATIFIED REVERSE FOLDED FLOWS, by J. F. Heyda. Preliminary rept. on Contract AT(11-1)-171. Feb 61, 10p. 2 refs.

HW-SA-2539 $1.60

Hanford Atomic Products Operation, Richland, Wash.
CALIBRATION OF VENTURIS FOR HIGH PRESSURE, HIGH TEMPERATURE WATER SERVICE, by M. E. Shockley. 9 May 62, 15p.

PB 160 787 $12.00

Texas A. and M. Coll., College Station.
CHARACTERISTICS OF ANCHOR CABLES IN UNIFORM CURRENTS, by Basil W. Wilson. Rept. on Contract Nonr-2119(02). Apr 60, 170p. 28 refs. Technical rept. no. 204-1; Reference 60-5T; AD-239 842.

DESCRIPTORS: *Ships, Mooring, Ocean currents, Cable assemblies, *Anchors, *Hydrodynamics, Fluid flow, Drag, Mathematical analysis, Theory

An exact solution is treated of the equilibrium in a fluid of a flexible mooring cable of uniform line density subject to a steady current whose velocity is constant with depth. Re-examination of experimental data for towed cables justifies the description of the hydrodynamic drag forces in terms of normal and tangential components of the velocity with respect to the cable, and indicates the effects of roughness or stranding of the cable. The analysis includes the full effect of these forces. The general solution is shown to yield previously known solutions for particular cases such as that of the catenary. Results are presented in dimensionless form in figures and tables and define the scope (cable length/depth), stance (horizontal projection/depth), relative tensions (surface or bottom

MND-C-2500-3 $7.60

Martin [Marietta Corp.] Baltimore, Md.
APWRC-SYNFAR-02, A PI AND DSN THEORY FORTRAN-II CODE FOR STATIC AND DYNAMIC SYNTHESIS OF TWO-DIMENSIONAL FLUX AND REACTIVITY, by T. M. Olsen. Rept. on Contract AT(30-1)-2431. May 62, 77p. 10 refs.

MECHANICS

AD-275 734 $9.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
STABILITY OF EQUILIBRIUM OF CONTINUOUS BODIES, by W. T. Koiter. Technical rept. no. 79 on Contract Nonr-562(10). Apr 62, 113p. 19 refs. CU11-79.

DESCRIPTORS: *Continuous media, *Stability *Elasticity, Buckling, *Deformation, Mechanics, Kinetic theory, *Applied mathematics, Differential equations, Load distribution, Calculus of variation, Partial differential equations, Series, Integral equations, Matrix algebra, Functions, Tensor analysis

Chapter 3 of a projected book "Theory of Elastic Stability and Post-Buckling Behaviour".

PB 160 780 $19.75

California Inst. of Tech., Pasadena.
VIBRATIONS OF COMPOSITE SYSTEMS, by R. H. MacNeal. Technical rept. no. 4 on Contract AF 18(600)669. 1954, 313p. 30 refs. [OSR TN-55-120] AD-63 118.

DESCRIPTORS: *Linear systems, Airplanes, *Vibration, Electrical networks, Impedance, Mechanics, Mathematical analysis, Matrix algebra.

Contents:
Normal mode theory
Interconnection theory
Properties of impedance functions
Theorems regarding two systems with one interconnectio
Theorems regarding weakly coupled systems
Mode shapes and energy relationships in weakly coupled systems
General calculation procedures for coupled modes
Analysis of symmetrical airplane

DC-61-6-40 $2.60

General Electric Co., Cincinnati, Ohio.
PHOTOTHERMOELASTICITY TECHNIQUES AND APPLICATION, by W. E. Greenwald. Preliminary rept. on Contract AT(11-1)-171. 26 June 61, 21p. 3 refs.

DC-61-3-128 $1.10

General Electric Co., Cincinnati, Ohio.
STRESSES IN HEXAGONAL TUBES, by F. E. Wells. Preliminary rept. on Contract AT(11-1)-171. 27 Mar 61, 9p.

Aerodynamics and Pneumatics

AD-282 002 $1.25

Aerojet-General Corp., Azusa, Calif.
BASIC PRINCIPLES OF THE INDICIAL LIFTING-SURFACE FLUTTER-ANALYSIS PROCEDURE, by Bernard Mazelsky and Harry B. Amey, Jr. Rept. on Dynamic Problems in the Mechanics of Flight, Contract AF 33(616)7420. May 62, 45p. 2 refs. Rept. no. 2134; ASD TDR-62-44.

DESCRIPTORS: Surfaces, *Lift, *Flutter, *Aerodynamics, Wings, *Swept wings, *Triangular wings, Hypervelocity vehicles, Distortion, Analog computers, Mathematical prediction, *Elasticity.

A method of flutter analysis utilizing indicial functions to represent the unsteady aerodynamics is described. Basic concepts are illustrated for a two-dimensional wing; the extension to a spanwise distorting wing is also discussed. Significant aerodynamic parameters pertinent to a highly swept, hypersonic delta wing are reviewed. For these wings the principal factor for adequate prediction of flutter is determination of the steady and quasi-steady aerodynamic influence coefficients. The unsteady contributions are shown to have a negligible effect on the flutter characteristics. (Author)

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NAS 1.12:119
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
LINEARIZED SUPERSONIC NONEQUILIBRIUM FLOW PAST AN ARBITRARY BOUNDARY, by James J. Der. 1961, 16p. 7 refs. NASA Technical rept. R-119.

DESCRIPTORS: *Supersonic flow, Mathematical analysis, Integral transforms, *Gas flow, Fluid mechanics, Equations, Differential equations.

After a brief review of the inviscid nonequilibrium flow equations in general and of the derivation of the linear nonequilibrium flow equations, the supersonic small-perturbation flow field past an arbitrary boundary is found, by the Laplace transformation, at the vicinity of the initial outgoing frozen Mach line, the vicinity of the boundary, and far downstream of the initial outgoing frozen Mach line. Closed-form solutions are obtained and the general results are applied to compute the geometry of a boundary having constant pressure and the flow at the surface of a biconvex airfoil. A method of extending the results to the entire flow field is indicated. (Author)

PB 160 791 $8.60

Army Ballistic Missile Agency [Huntsville] Ala.
COMPRESSIBLE FLOW TABLES k = 1.28 ADIABATIC FLOW WITH FRICTION. 10 Feb 61, 94p. 4 refs. Rept. no. RA-TR-6-61; AD-251 618.

DESCRIPTORS: *Adiabatic gas flow, Specific heat, Ducts, Friction, Tables, *Compressible flow.

ACCO-66 $1.60

American Cyanamid Co., Winchester, Mass. LABORATORY SCALE ABRASIVE TESTS ON ION EXCHANGE RESINS, by Hugh A. Ladner and George W. Lower. Rept. on Contract AT(49-1)-533. 28 July 54, declassified 3 July 62. 12p.

ACCO-21 $1.60

American Cyanamid Co., Winchester, Mass. PRELIMINARY LEACHING INVESTIGATION OF BABROSCO AND AFRIKANDER LEASE RESIDUES, by R. F. Hollis and J. T. Lynch. Rept. on Contract AT(49-1)-533. 12 May 52, declassified 3 July 62. 13p.

ACCO-18 $4.60

American Cyanamid Co., Winchester, Mass. PRELIMINARY LEACHING INVESTIGATION OF ORES FROM RADIUM HILL, SOUTH AUSTRALIA, by R. F. Hollis, J. B. Breymann, and J. T. Lynch. Rept. on Contract AT(49-1)-533. 30 June 52, declassified 3 July 62. 46p.

ACCO-15 $8.10

American Cyanamid Co., Watertown, Mass. PROGRESS REPORT, Rept. for 16 Sep-15 Nov 51, on Contract AT(49-1)-533. 17 Dec 51, declassified 3 July 62. 81p.

ACCO-17 $9.10

American Cyanamid Co., Winchester, Mass. PROGRESS REPORT. Rept. for 16 Nov 51-15 Jan 52, on Contract AT(49-1)-533. Declassified 3 July 62. 105p.

ACCO-20 $8.60

American Cyanamid Co., Winchester, Mass. PROGRESS REPORT. Rept. for 16 Jan-15 Mar 52, on Contract AT(49-1)-533. Declassified 3 July 62. 100p.

ACCO-23 $4.60

American Cyanamid Co., Winchester, Mass. RECOVERY OF MANGANESE DIOXIDE FROM RAND BARREN SOLUTIONS, by Dr. A. W. Owens. Rept. on Contract AT(49-1)-533. 15 Mar 53, declassified 2 July 62. 46p.

ACCO-22 $2.60

American Cyanamid Co., Winchester, Mass. RECOVERY OF URANIUM BY ION EXCHANGE OR BY URANOUS PHOSPHATE PRECIPITATION FROM SULFURIC ACID LEACH SOLUTIONS PRODUCED FROM AUSTRALIAN DAVIDITE ORE CONCENTRATES, by D'Arcy R. George. Rept. on Contract AT(49-1)-533. 9 June 52, declassified 3 July 62, 22p.

ACCO-11 $2.60

American Cyanamid Co., Watertown, Mass. RECOVERY OF URANIUM FROM CONGO LEACH LIQUORS WITH ION EXCHANGE RESINS, by R. H. Kennedy and F. A. Howland. Rept. on Contract AT(49-1)-533. 31 Oct 51, declassified 3 July 62. 25p.

ACCO-24 $1.60

American Cyanamid Co., Winchester, Mass. RECOVERY OF URANIUM FROM HIGH GRADE AUSTRALIAN RUM JUNGLE URANIUM ORE, by D'Arcy R. George. Rept. on Contract AT(49-1)-533. 22 Aug 52, declassified 2 July 62. 20p.

ACCO-41 $7.60

American Cyanamid Co., Winchester, Mass. UTEX LEACHING, THICKENING AND FILTRATION TESTS, by Alan Stanley, D'Arcy R. George and others. Rept. on Contract AT(49-1)-533. 15 Mar 54, declassified 3 July 62. 81p.

PB 160 786 $8.60

Armour Research Foundation, Chicago, Ill. BRAZING OF HEAT-RESISTANT METALS, by N. Bredzs and H. Schwartzbart. Rept. for 23 June 58-22 June 59, on Fundamentals of Brazing, Contract DA 11-022-ORD-957. 23 Oct 59, 94p. 5 refs. ARF Proj. no. B-039; AD-229 022.

DESCRIPTORS: *Heat resistant alloys, *Brazing, *Metals, *Reinforcing materials, Penetration, Diffusion, Grains (Metallurgy), Melting, Pellets, Vacuum furnaces, Eutectics, Tests.

A program of research to study two phenomena important in the brazing of high-temperature alloys is described. These phenomena are (1) dissolution of base metal in the molten filler metal, and (2) penetration of filler metal into the grain boundaries of the base metal. The experimental approach utilized pad tests in which a pellet of filler alloy was melted on the base metal during a vacuum furnace brazing cycle, with 15 minutes at temperature. Only the Fe-B filler alloy showed a great tendency to grain boundary penetration: in plain carbon steels to an increasing extent with increasing carbon content, and in stainless steels if chromium were present. The role of secondary diffusion processes in influencing grain boundary penetration was shown. In general, Ni-B will penetrate grain boundaries of the base metal if it picks up Fe by dissolution of base metal. Pd-B did not penetrate base-metal grain boundaries, but did dissolve extensive quantities of base metal at 2150°F. Fe-Si formed extremely brittle alloy layers at the base metal-filler metal interface.

ARF-2198-11 $1.10

Armour Research Foundation, Chicago, Ill. IMPROVED ZIRCONIUM ALLOYS, by D. Weinstein, F. C. Holtz, and R. J. Van Thyne. Quarterly rept. 1 Oct-31 Dec 60, on Contract AT(11-1)-578. 2 Feb 61, 7p. EURAEC-28.

tension/depth x cable weight in water per unit length) in terms of angles of inclination with the horizontal of the cable at the upper and lower tiepoints. An example is given of the application of results to the mooring of ships in a tideway. (Author)

PB 152 909 $8.10

Vitro Labs., Silver Spring, Md.
MICROBUBBLE PERSISTENCE, by W. R. Turner. Preliminary research rept. 29 Jan 60, 90p. 16 refs. Technical note TN-N4329-12960; AD-234 534.

DESCRIPTORS: *Bubbles, Fluid mechanics, Physical properties.

Evidence of microbubble persistence was obtained by generating bubbles at the bottom of a water tank and then measuring the decay of ultrasonic attenuation as bubbles of various sizes rose to the surface. Comparison of the experimental decay curves with those computed on the basis of classical theory disclosed persistence that appeared to be a function of the solid particle content of the water and indicated that stabilized bubbles 20 to 30μ in radius may have been formed in water of high particulate content. The persistence effect in waters of low particulate content lasted over 100 hr. Substantial and persistent abnormal attenuation was detected in all of the fresh tap water measured. This amounted to a minimum 44% increase over that of distilled water at the test frequency of 5.125 mc and is believed due to stabilized bubble nuclei somewhat less than 0.7μ in size. An interesting discovery was the rise of attenuation in an uncovered test basin in contrast to that in a covered basin. Since the significant difference in test condition was that of excluding dust, it is tentatively concluded that dust provides an important vehicle for microbubble entry into water. A correlation is shown between abnormal attenuation in water and the presence of microbubbles. Hypotheses are developed to explain the stabilization phenomena and the dust particle effect. (Author)

METALLURGY

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Advanced Technology Labs., Mountain View, Calif.
INVESTIGATION OF THE TECHNICAL FEASIBILITY OF COLD EXTRUSION FOR ZIRCALOY-2 TUBING PRODUCTION. Quarterly technical progress rept. Oct-Dec 60, on Contract AT(04-3)-250. 7p. EURAEC-90.

ATL-A-119 $1.60

Advanced Technology Labs., Mountain View, Calif.
INVESTIGATION OF THE TECHNICAL FEASIBILITY OF COLD EXTRUSION FOR ZIRCALOY-2 TUBING PRODUCTION. Quarterly technical progress rept. Jan-Mar 61, on Contract AT(04-3)-250. 13p. 1 ref. EURAEC-91.

ATL-A-120 $1.60

Advanced Technology Labs., Mountain View, Calif.
THE TECHNICAL FEASIBILITY OF COLD EXTRUSION FOR ZIRCALOY-2 TUBING PRODUCTION. Quarterly rept. no. 3, Apr-June 61, on Contract AT(04-3)-250. 14p. 1 ref. EURAEC-139.

AD-278 803 $2.50

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MATERIALS CENTRAL-ASM METALLURGICAL EDUCATIONAL LECTURES, by M. G. Fontana, A. M. Hall and others. Rept. on Materials Application. May 62, 105p. 21 refs. ASD TDR 62-396.

DESCRIPTORS: *Failure (Mechanics), *Corrosion inhibition, *Fracture (Mechanics), Rupture, Thermal stresses, *High temperature research, Metallurgy, *Friction, *Lubrication, Solids, Metals, Electrochemistry, Metal coatings, Chemical reactions, Load distribution, Fatigue (Mechanics), *Corrosion, Alloys.

This report consists of a series of lectures on failure analysis. Causes, cures, and preventive measures of corrosion are discussed. The general types of elevated-temperature service failures are described and the influence of static and dynamic loading, thermal cycling, corrosion, and inert environments are discussed herein. The sensitivity of present high strength structural alloys to brittle failure under various environmental and state of stress conditions is included. Present Air Force research efforts on the characteristic behavior of high strength materials are reviewed. This includes the relationship between mechanical wear and lubrication. A description of the interaction between two contacting solids causing wear and the basic principles of lubrication and lubrication techniques are given. (Author)

ACCO-10 $6.60

American Cyanamid Co., Watertown, Mass.
APPLICATION OF HEAVY MEDIA SEPARATION, FLOTATION AND CARBONATE LEACHING TO CONGO ORES, by John B. Breymann III. Rept. on Contract AT(49-1)-533. 31 Oct 51, declassified 3 July 62. 62p.

ACCO-37 $2.60

American Cyanamid Co., Winchester, Mass.
ION EXCHANGE STUDIES ON ACID LEACH LIQUOR FROM DURANGO RESIDUES, by Fred Pickwick, Jr. Rept. on Contract AT(49-1)-533. 25 Jan 54, declassified 2 July 62. 22p.

ACCO-43 $3.60

American Cyanamid Co., Winchester, Mass.
ION EXCHANGE TESTS ON LIQUORS AND PULPS PRODUCED FROM UTEX CORES, by E. T. Hollis, F. Pickwick, and others. Rept. on Contract AT(49-1)-533. 30 July 54, declassified 3 July 62. 34p.

AD-278 560 $2.25

General Electric Research Lab., Schenectady, N. Y.
RESEARCH ON DISPERSION HARDENING, by V. A. Phillips, R. W. Guard, and J. D. Livingston. Final rept. 15 May 59-15 Dec 61, on Solid State Research and Properties of Matter, Contract AF 33(616)6406. May 62, 92p. 55 refs. ARL 62-357.

DESCRIPTORS: *Alloys, *Hardening, *Dispersion hardening, Nickel alloys, Aluminum alloys, Titanium alloys, Aluminum compounds, Titanium compounds, Copper alloys, Cobalt alloys, Oxides, Single crystals, Electron microscopy, Intermetallic compounds, Oxidation, Deformation, Interferometers, Stresses, Temperature.

This three-part report is an attempt to better understand the mechanism by which second-phase particles strengthen alloys. Hardening in age-hardened Ni-Al and Cu-Co alloys was found to be due to the precipitation of coherent ordered Ni_3Al, or Co particles, respectively. Both showed coherency strain fields, but they were particularly clear in the latter. The main contract effects expected from coherent spherical particles were calculated and found to be consistent with those observed at Co particles. The shape and size of the Co particles agreed with earlier conclusions based on bulk magnetic measurements. Over aging in Cu-Co was found to be partly due to loss of full coherency which is helped by deformation. (Author)

HW-SA-2560 $7.60

Idaho U., Moscow.
A STUDY OF THE KINETIC AND MECHANICAL PROPERTIES OF A STABILIZED BETA PHASE PLUTONIUM ALLOY, by John Maurice Taylor. Master's thesis. 31 May 62, 72p. 13 refs.

NYO-9430 $2.60

Massachusetts Inst. of Tech., Cambridge.
DIFFUSION IN COBALT NICKEL ALLOYS, by Ken-ichi Hirano, R. P. Agarwala, and others. Rept. no. 4 on Contract AT(30-1)-1975. 6 June 62, 23p. 9 refs.

NYO-9431 $1.60

Massachusetts Inst. of Tech., Cambridge.
DIFFUSION OF IRON, COBALT AND NICKEL IN GOLD, by David N. Duhl, Ken-ichi Hirano, and Morris Cohen. Rept. no. 5 on Contract AT(30-1)-1975. 6 June 62, 20p. 19 refs.

TID-15989 $2.60

Massachusetts Inst. of Tech., Cambridge.
PHYSICAL METALLURGY OF UNCOMMON METALS by Robert E. Ogilvie and John T. Norton. Rept. on Contract AT(30-1)-981. 25 May 62, 27p. 1 ref.

PB 160 807 $4.60

Materials Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
ELASTIC LIMIT BY THE RESIDUAL STRAIN METHOD USING SR4 AND TUCKERMAN GAGES ON ALUMINUM ALLOY, by Alton W. Brisbane and Richard F. Klinger. Rept. for Aug 58-May 59, on Material Analysis and Evaluation Techniques. Mar 60, 42p. WADC-TN-59-340; AD-237 189.

DESCRIPTORS: *Aluminum alloys, Elasticity, Determination, Strain gages, Test methods, Tensile properties, Deformation, Stresses.

The "elastic limit" of 7075-T6 aluminum alloy was defined in terms of SR4 and Tuckerman gage indications through the use of residual microstrains following tensile and compressive loading and unloading. Residual strain vs. applied load relationships were developed as functions of reference stress level and material and gage history. Some qualitative theoretical and experimental explanation of residual microstrain indications was attempted. The results indicate there is considerable interaction between SR4 gage characteristics and specimen material properties in the region of residual microstrain considered and that a better understanding of the strain indications should be obtained before they are used to explain microdeformations of metals. (Author)

PB 160 814 $4.60

National Research Corp., Cambridge, Mass.
INVESTIGATION OF METHODS FOR PRODUCING THICK COATS, by Philip Godley and Philip J. Clough. Final rept. on Contract NOas 10089. 30 Apr 50, 48p. AD-136 167.

DESCRIPTORS: *Metal coatings, Production, Feasibility studies, Electrodeposition, Metallic smoke deposits, Coatings, Temperature, Condensation, Zinc, Aluminum, Nickel, Steel, Copper, Molybdenum.

Research was conducted to investigate the feasibility of producing thick metallic coats by deposition from the vapor phase. A study of Al coatings deposited on Cu substrates at condensing temperatures between 80° and 600°C and on Al, Mo, Ni, and steel substrates indicated that the structure and ductility of the deposit was primarily a function of the temperature of condensation, except for steel. Maximum ductility with Cu substrate was obtained at 400° to 420°C. Coats of Mo were deposited on graphite by the thermal decomposition of MoS_2, but the rate was too low for the production of thick coats. The best rates of Mo deposition were produced from the Zn vapor reduction of $MoCl_5$ between 1200° to 1250°C, but thick carbide layers were formed simultaneously; higher rates of ductile equiaxed grain deposits were indicated by increasing the evaporation rate of $MoCl_5$. A Mo coat of 0.001 in., which was deposited on steel, peeled; adherent coats up to 0.008 in., were deposited on graphite. The codeposition of Mo and Si on a graphite substrate was obtained at 950°C; the ratio of Si to Mo in the deposit was low, but the coat showed greater resistance to oxidizing acids than pure Mo; thermodynamic calculations of this reaction are included in the appendix.

ARF-2198-13 $4.60

Armour Research Foundation, Chicago, Ill.
IMPROVED ZIRCONIUM ALLOYS, by D. Weinstein, F. C. Holtz, and R. J. Van Thyne. Summary rept. 1 Apr 60-31 Jan 61, on Contract AT(11-1)-578. 24 Feb 61, 40p. 17 refs. EURAEC-89.

GV-298 $1.60

Armour Research Foundation, Chicago, Ill.
IMPROVEMENT OF THE WORKING CHARACTERISTICS OF IRON CHROMIUM ALUMINUM ALLOYS. Quarterly rept. no. 1, 16 Nov 55-10 Feb 56, on Contract AT(11-1)-171. 21 Feb 56, declassified 16 Sep 59. 13p.

BMI-X-204 $1.10

Battelle Memorial Inst., Columbus, Ohio.
USAEC AECL COOPERATIVE PROGRAM, by Stanley W. Porembka. Quarterly progress rept. Mar-May 62, on Contract W-7405-eng-92. 11 June 62, 7p.

AD-278 807 $4.00

Brush Beryllium Co., Cleveland, Ohio.
INVESTIGATION OF THE EFFECTS OF PROCESSING VARIABLES AND FABRICATION TECHNIQUES UPON THE PROPERTIES OF INTERMETALLIC COMPOUNDS, by Richard S. Truesdale, Byron B. Lympany, and others. Final rept. for 1 Apr 60-30 Sep 61, on Materials Application, Contract AF 33(616)7108. June 62, 269p. 42 refs. ASD-TDR-62-476.

DESCRIPTORS: *Intermetallic compounds, *Refractory materials, Heat resistant alloys, Tantalum compounds, Zirconium compounds, *Beryllium compounds, Niobium compounds, High temperature research, Powder metals, Preparation, Mechanical properties, Thermal conductivity, Oxidation, Sintering.

Intermetallic compounds of $NbBe_{12}$, Nb_2Be_{17}, Nb_2Be_{19}, and Ta_2Be_{17} were fabricated by uniaxial pressing and sintering techniques. Results of sintering studies on Nb_2Be_{17} are presented and discussed. The effects of particle size, stoichiometry, temperature, and time upon the sintered density, grain size, and strength of Nb_2Be_{17} are described. A modulus of rupture evaluation is made on Nb_2Be_{17} up to 2750°F, and results of tensile, Young's modulus, thermal conductivity, and oxidation studies are discussed. The feasibility of scaling-up to large and complicated shapes by isostatic pressing, slip casting, extrusion, hot pressing, and flame spraying is demonstrated. The temperature-pressure-flow characteristics of several beryllides at temperatures of 2750° to 3050°F are evaluated together with microstructural stability. The metallurgical fabrication techniques of forging, forming, and rolling as applied to Nb_2Be_{17} are examined. (Author)

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Bureau of Mines, Washington, D. C.
COBALT: A MATERIALS SURVEY, by Joseph H. Bilbrey, Jr. 1962, 140p. 25 refs. Information Circular 8103.

DESCRIPTORS: *Cobalt, Cobalt compounds, Oxides, Cobalt alloys, Geology, Minerals, Deposits, Commerce, Control, Processing, Transition elements, *Bibliography.

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Cornell U., Ithaca, N. Y.
TEMPERATURE AND PRESSURE DEPENDENCE OF CREEP IN POTASSIUM, by Charles Rober Kohler. Master's thesis. Sep 61, 40p. 10 refs.

PB 160 778 $1.60

Cryogenic Lab., Ohio State U. Research Foundation, Columbus.
COEFFICIENTS OF THERMAL EXPANSION OF SOLIDS AT LOW TEMPERATURES. II. THE THERMAL EXPANSION OF MONEL, INCONEL, CONTRACID, SAE 1020 LOW CARBON STEEL AND TYPE 410 STAINLESS STEEL, by Howard W. Altman, Thor Rubin, and Herrick L. Johnson. Technical rept. no. 19 on Liquid Hydrogen as an Aircraft Fuel, Contract W33-038-ac-14794. 1 May 52, declassified 11 June 56. 19p. 3 refs. TR 264-19; ATI-158 988.

DESCRIPTORS: *Solids, *Thermal expansion, Low temperature research, *Metals, Steel, Stainless steel, Chromium alloys, Iron alloys, Nickel alloys, Alloys.

The overall accuracy, which is limited by ability to measure fringe diameters rather than by temperature measurement, ranges therefore from about 7% in the individual α values at 25° K through about 1% at 50° K, and 0.5% at 100° K to about 0.3% above 200° K.

TID-16032 $1.60

Denver Research Inst., Colo.
AN INVESTIGATION OF THE EFFECT OF METALLIC ADDITIONS UPON THE OXIDATION RESISTANCE OF $NbAl_3$, by Ronald L. Wells, Donald F. Klodt, and Charles E. Lundin. Quarterly progress rept. no. 1, 1 Sep 61-28 Feb 62, on Contract AT(11-1)-1092. Mar 62, 13p. DRI-2032.

DC-61-2-133 $2.60

General Electric Co., Cincinnati, Ohio.
MILESTONE #3A, ISSUE DESIGN DATA ON INCONEL X, by M. A. Pugacz. Status rept. on Contract AT(11-1)-171. 27 Feb 61, 30p.

AGN-8051 $1.10

Aerojet-General Nucleonics, San Ramon, Calif.
RUBIDIUM CORROSION CAPSULE PROGRAM.
Quarterly technical rept. no. 4, 1 Nov 61-Jan 62, on Contract AT(04-3)-368. 17 Apr 62, 9p.

AD-281 712 $1.75

Armour Research Foundation, Chicago, Ill.
RESEARCH ON THE BASIC NATURE OF STRESS CORROSION FOR VARIOUS STRUCTURAL ALLOYS AT ROOM AND ELEVATED TEMPERATURE, by Frank A. Crossley. Final rept. 15 Oct 60-14 Dec 61, on Metallic Materials, Contract AF 33(616)7612. May 62, 70p. 6 refs. ASD-TR-61-713.

DESCRIPTORS: *Titanium alloys, *Aluminum alloys, *Magnesium alloys, *Stainless steel, Sea water, Water, Salinity, Stresses, *Corrosion, Fracture (Mechanics), Grains (Metallurgy), Tensile properties, Temperature, *Failure (Mechanics), Solutions, Salts, Chlorides, Heat treatment, Mechanical properties, Test methods, Microstructure.

The relationship between quantity of ASTM sea salt, varying from 0.0002 to 0.02 g/sq in., and thickness of anodized film--0, 2, and 8 micro-inches--in elevated temperature stress-corrosion cracking of the titanium alloys Ti-6Al-4V and B-120VCA was investigated. Exposure conditions were 800°F-25,000 psi-190 hr for the former alloy and 600°F-1000,000 psi-190 hr for the latter. Damage was progressively greater with increasing quantity of salt. The anodized films appeared to be of no benefit to the Ti-6Al-4V alloy; however, it appeared that limited protection was afforded B-120VCA. The alloys: 2024-T86, 7075-T6, ZK-60A-T5, 17-7 PH RH 950, and B-120VCA in two conditions of grain size and two conditions of surface treatment were tested as follows: tensile test in air at room temperature, and in distilled water and ASTM sea water at 32°, 75°, and 212°F; and statically loaded at 90% of the yield strength in media of air, water, and ASTM sea water at room temperature. (Author)

BMI-X-201 $3.60

Battelle Memorial Inst., Columbus, Ohio.
CORROSION ANALYSIS OF ORNL PILOT PLANT COMPONENTS, by P. D. Miller, W. L. Stiegelmeyer, and others. 15 May 62, 37p.

AD-282 932 $1.50

Defense Metals Information Center, Columbus, Ohio.
THE EFFECT OF MOLTEN ALKALI METALS ON CONTAINMENT METALS AND ALLOYS AT HIGH TEMPERATURES, by M. F. Amateau. Rept. on Contract AF 33(616)7747. 28 May 62, 59p. 71 refs. DMIC rept. 169.

DESCRIPTORS: *Liquid metals, Containers, Corrosion, Refractory materials, *Alkali metals, Sodium, Lithium, Tantalum, Columbium, Molybdenum, Potassium, Rubidium, Cesium.

Most high-temperature engineering materials have adequate resistance to liquid sodium and NaK for use up to 1600 F. The refractory metals are deleteriously affected by excessive amounts of oxygen in the sodium. Molten lithium represents a more severe environment. Tantalum, columbium, and molybdenum may have limited applicability. The refractory metals appear to be suitable for the containment of liquid potassium, rubidium, and cesium. (Author)

AD-278 652 $1.75

Defense Metals Information Center, Columbus, Ohio.
THE EFFECTS OF SOLUTES ON THE DUCTILE-TO-BRITTLE TRANSITION IN REFRACTORY METAL METALS, by G. T. Hahn, A. Gilbert, and R. I. Jaffee. Rept. on Contract AF 18(600)1375. 28 June 62, 62p. 83 refs. DMIC memo. 155.

DESCRIPTORS: Vanadium, Niobium, Tantalum, Chromium, Molybdenum, Tungsten, *Brittle materials, *Refractory materials, Metals, Heat resistant alloys, Deformation, Fracture (Mechanics), Transition elements, Solubility, Heat treatment, Transition temperature, Grains (Metallurgy), Rupture, Dislocations, Purification, Melting, Stresses.

Of the various possible solutes for refractory metals, the interstitially dissolving elements have the most profound effect on the ductile-to-brittle transition. It is not surprising, therefore, that the great bulk of significant data relates to interstitial solutes. The substitutional solutes and dispersed phases are of greatest interest in affecting high-temperature properties, and only superficial attention has been paid to their effects on low-temperature deformation and fracture. This memorandum summarizes present knowledge of the effects of both interstitial and substitutional solutes, as well as dispersions. In attempting to provide a unified treatment of the effects of solutes in Groups V-A (vanadium, columbium, and tantalum) and VI-A (chromium, molybdenum, and tungsten) transition refractory metals, a number of generalizations appear warranted. These generalizations, while not necessarily proven in all cases, are consistent with available evidence. They are presented in the form of propositions in the following sections and will be discussed and documented where possible. (Author)

HW-73211 $1.10

Hanford Atomic Products Operation, Richland, Wash.
INHIBITION OF CORROSION OF 304-L IN HNO_3-HF MIXTURES WITH ALUMINUM, by W. L. Walker. Rept. on Contract AT(45-1)-1350. 5 Apr 62, 9p.

AD-278 574 $0.50

Naval Research Lab., Washington, D. C.
OXIDE BONDING AND THE CREEP-RUPTURE STRENGTH OF NICKEL, by T. R. Cass and M. R. Achter. Interim rept. 22 June 62, 11p. 9 refs. NRL rept. 5803.

DESCRIPTORS: *Nickel, *Creep, *Rupture, Oxides, Stratification, Sintering, Bonding, Grains (Metallurgy), Oxidation, Microstructure, Fracture (Mechanics).

AD-282 225 $2.75

Thompson Ramo Wooldridge Inc., Inglewood, Calif.
INVESTIGATION OF WELDING OF COMMERCIAL COLUMBIUM ALLOYS, by J. M. Gerken and J. M. Faulkner. Final rept. 1 Jan 61-15 Jan 62, on Metallic Materials, Contract AF 33(616)7796. May 62, 148p. 20 refs. ASD-TDR-62-292.

DESCRIPTORS: *Welding, *Niobium alloys, Welds, Mechanical properties, Microstructure, *Refractory materials, Re-entry vehicles.

An investigation was made of the welding characteristics of three commercial columbium base alloys, FS82, D31, and F48. Tungsten inert gas, electron beam, spot, and flash butt welding methods were included in this investigation. The effect of the welding variables travel speed, shielding gas composition and purity, filler metal additions, preheat and post heat were studied. Thermal cycles were measured in the fusion zone and heat affected zone of TIG welds to help explain mechanical properties and microstructure on the basis of physical metallurgy of each alloy. The effect of welding on all alloys was to increase the ductile to brittle transition temperature. This temperature was increased 200°F for FS82, 800°F for D31, and 500°F to 800°F for F48 over that of the as-received wrought sheet. Of several post heat treatments investigated, those most beneficial in lowering the transition temperature of welds were: 2000°F for 4 hours for FS82; 2100°F for 24 hours for D31; and 2500°F for 4 hours for F48. The electron beam welding process consistently produced more ductile welds than the TIG process. (Author)

Y-BG-15 $2.60

Union Carbide Nuclear Co., Oak Ridge, Tenn.
RECOVERY OF URANIUM FROM UNIRRADIATED SCRAP AT Y-12, by J. R. Barkman. Rept. on Contract W-7405-Eng-26. 1 May 62, 23p.

PB 160 813 $7.60

Universal-Cyclops Steel Corp., Bridgeville, Pa.
COBALT-BASE ALLOY AND MELTING PRACTICE DEVELOPMENT PROGRAM, by N. R. Harpster, T. L. Robertshaw, and J. H. Sye. Final rept. on Contract NOas 57-448-c. 31 Oct 59, 79p. AD-232 283.

DESCRIPTORS: *Cobalt alloys, *Nickel alloys, *Chromium alloys, *Tungsten alloys, Metals, Additives, Mechanical properties, Melting.

An evaluation was made of the effects of Ti, Al, Mo, W, and Nb with Ta on the elevated temperature properties of Co-base alloys. The base contained a 50:30:20 ratio of Co:Ni:Cr, respectively. Increasing Ti up to 5.0% improved rupture strength; results indicated that Ti must be restricted to about the same level to obtain a forged product. Additions of W up to 15.0% were desirable. Nb with Ta up to 2.0% improved high temperature strength; however, an interaction between Al and Nb with Ta was detrimental. Al above 1.0% was an undesirable alloying addition. The effect of Mo was not established. Solution treated and aged hardness was, in general, increased by the same elements which improved rupture strength. The exception was Al which decreased rupture strength but significantly increased aged hardness. One experimental composition had good elevated temperature strength for a Co-base alloy. This alloy had a rupture life of 230 hr at 1650° F and 20,000 psi and had the following nominal composition: 0.03% C, 15.8% Cr, 15.0% W, 23.7% Ni, 4.0% Ti, 2.0% Nb with Ta, 0.005%B, 0.05% Zr, and the balance Co. (See also PB 142 611)

TID-15971 $1.10

W. M. Keck Lab. of Engineering Materials, Calif. Inst. of Tech., Pasadena.
NICKEL-RICH SOLID SOLUTIONS IN BINARY ALLOYS WITH TIN, GERMANIUM AND SILICON, by William Klement, Jr. Technical rept. no. 6 on Contract AT(04-3)-221. June 62, 10p. 9 refs.

Ferrous Metals

AD-281 888 $1.50

Defense Metals Information Center, Columbus, Ohio.
PROPERTIES OF MAR-AGING STEELS, by D. C. Drennen and D. B. Roach. Rept. on Contract AF 33(616)7747. 2 July 62, 59p. DMIC memo. 156.

DESCRIPTORS: *Steel, Nickel alloys, Molybdenum alloys, Cobalt alloys, Hardening, Mechanical properties, Fracture (Mechanics), Airframes, Rocket cases, Heat treatment, Aging, Tensile properties, Welding, Forging, Corrosion, Industrial production.

The development of a series of high-nickel martensitic steels strengthened by the precipitation hardening mechanism was announced by the International Nickel Company late in 1959. The steels, termed Mar-Aging steels, are reportedly heat treatable to yield strengths of 250,000 to 300,000 psi with excellent toughness in the presence of notches or cracks.

Since the initial release of data on these steels, considerable effort has been expended in optimizing their composition, in studying their properties, and in evaluating them for various defense applications. Several companies have been licensed to produce the steels. Although still in the development stage, the steels show significant promise for aerospace applications. This memorandum presents properties on four Mar-Aging steels.

TIM-573 $1.10

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
HASTELLOY X-TYPE-316 STAINLESS STEEL FORCED CONVECTION SODIUM CORROSION LOOP TEXT, HXLM-3, by R. C. Shaw. Rept. on Contract AT(11-1)-229. 23 Sep 58, declassified 8 Sep 59. 10p.

ORO-561 $1.10

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
IONIZATION AND CHARGE TRANSFER CROSS SECTIONS, by D. W. Martin and J. W. Hooper and others. Technical status rept. no. 11, 1 Mar-31 May 62, on Contract AT(40-1)-2591. 1 June 62, 9p.

NYO-10131 $2.60

Rochester U., N. Y.
MEASUREMENT OF THE POLARIZATION OF 7-8 MEV PROTONS INELASTICALLY SCATTERED FROM THE FIRST EXCITED STATE OF Ni^{58} AND Ti^{48}, by E. E. Griffin and W. Parker Alford. Rept. on Contract AT(30-1)-875. 6 Mar 62, 22p.

NYO-10234 $1.60

Rochester U., N. Y.
ON HYPERON NUCLEON SCATTERING, by C. Dullemond and J. J. de Swart. Rept. on Contract AT(30-1)-875. 1 May 62, 20p. 12 refs.

Instruments and Installations

TID-16021 $2.60

Badger Meter Mfg. Co., Milwaukee, Wis.
DEVELOPMENT LEADING TO AN IMPROVED DENSITOMETER FOR HELIUM GRAPHITE OR NITROGEN GRAPHITE FLOW STREAMS. Quarterly rept. no. 189-6, Feb-Apr 62, on Contract AT(11-1)-1111. 21 May 62, 21p.

RIB-46 $1.60

David Sarnoff Research Center, Princeton, N. J.
DEVELOPMENT OF HIGH SPEED ELECTRON ACCELERATOR STRUCTURES, by W. T. Achor and J. A. Zenel. Interim rept. no. 13, 1 Nov 60-31 Mar 61, on Contract AT(30-1)-1958. 15p.

TID-15983 $8.60

Michigan State U., East Lansing.
RESONANT EXTRACTION FROM THREE SECTOR LOW SPIRAL CYCLOTRONS, by H. G. Blosser, M. M. Gordon, and T. I. Arnette. 4 Apr 62, 61p. 27 refs.

Order from GPO $0.20 as C 13.44:48

National Bureau of Standards, Washington, D. C.
DETERMINATION OF TOTAL X-RAY BEAM ENERGY WITH A CALIBRATED IONIZATION CHAMBER, by John S. Pruitt and Steve R. Domen. 5 June 62, 16p. 19 refs. NBS Monograph 48.

DESCRIPTORS: *Ionization chambers, Calibration, Bremsstrahlung, Radioactive isotopes, Cobalt, Cesium, Gamma rays, Electron tubes, X-rays, Energy, Determination.

This report describes the use of an air-filled aluminum-alloy ionization chamber to determine the energy transported by a bremsstrahlung beam with maximum photon energy in the range 6 to 170 Mev. The experimental calibrations of this chamber over this energy range are given, as well as the results of calibration experiments made with a 250-kv constant-potential X-ray tube and with Cs^{137} and Co^{60} gamma-rays. Information is presented about the change in calibration when the chamber is used with different experimental conditions, and when either its dimensions or its alloy composition are changed slightly. This report can be used to construct a replica chamber and to determine its absolute calibration between 6 and 170 Mev under a variety of experimental conditions. (Author)

ORNL-TM-137 $2.60

Oak Ridge National Lab., Tenn.
NUCLEAR INSTRUMENTATION FOR SCINTILLATION AND SEMICONDUCTOR SPECTROSCOPY, by T. L. Emmer. 3 May 62, 30p.

PPAD-450-E $1.60

Princeton-Pennsylvania Accelerator, Princeton U., N. J.
SOME MEASUREMENTS FOR THE EFFICIENCY IN OBSERVING PHOTOELECTRONS IN IMAGE INTENSIFIERS, by J. R. Waters, G. T. Reynolds and others. Rept. on Contract AT(30-1)-2137. 1 Mar 62, 18p. 4 refs.

Nuclear Engineering and Power

ATL-A-114 $1.10

Advanced Technology Labs., Mountain View, Calif.
DEVELOPMENT OF CLAD CERAMIC FUEL PLATES BY SPRAY COATING TECHNIQUES. Quarterly technical progress rept. Oct-Dec 60, on Contract AT(04-3)-250. 5p. EURAEC-63.

APAE-116 $3.60

Alco Products, Inc., Schenectady, N. Y.
SILVER-CADMIUM-INDIUM ABSORBER DEVELOPMENT, by R. A. Shaw and R. L. Harris. Rept. on Contract AT(30-1)-2639. 13 June 62, 30p. 5 refs.

APAE-35 (Suppl. 3) $2.60

Alco Products, Inc., Schenectady, N. Y.
SM-1 SHIELDING ANALYSES, by L. D. Stephenson. Rept. on Contract AT(30-1)-2639. 20 June 62, 29p. 10 refs.

ACNP-6112 $6.60

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
PATHFINDER ATOMIC POWER PLANT. PROGRAM AND ORGANIZATION FOR PREOPERATIONAL AND NUCLEAR TESTING. Rept. on Contract AT(11-1)-589. 66p. Prepared in cooperation with Northern States Power Co., Minneapolis, Minn.

A technique for measuring the creep and rupture strength of nickel specimens bonded by sintered oxide layers has been developed. This technique is used in the investigation of the role of grain-boundary oxide in the oxidation strengthening of nickel during creep at 817°C. From the inverse dependence of the rate of bonding on the thickness of the starting oxide, it is suggested that the rate of diffusion of Ni^{++} through NiO is the controlling process at the start of sintering. Comparisons of the creep and rupture strength and of the microstructure of sintered couples with conventional creep specimens suggest that rupture in nickel is prevented by load-bearing, intergranular layers of oxide. (Author)

PB 160 872 $1.10

Navy Electronics Lab., San Diego, Calif.
EVALUATION OF STEEL ALLOYS SUBJECTED TO HIGH-FREQUENCY FLEXURAL MOTION, by J. C. Thompson. 17 Dec 59, 9p. Evaluation rept. 949.

DESCRIPTORS: *Steel, *Chromium alloys, Very high frequency, *Sound generators, Fatigue (Mechanics), Stresses.

Various materials were tested in an attempt to find an alloy steel of suitable strength for use in sound-generating devices which are subjected to very high frequencies. A 5 per cent chromium steel, Vasco-Jet, was found to be entirely suitable for the purpose, possessing high strength and fatigue resistance, toughness, ductility, and thermal stability. (Author)

AD-282 937 $0.50

Rock Island Arsenal Lab., Ill.
ELECTRICAL RESISTANCE CORROSION INDICATORS LITERATURE REPORT, by Robert E. Johnson. 11 May 62, 14p. 11 refs. Rept. no. 62-1694.

DESCRIPTORS: *Corrosion inhibition, *Oils, Thin films, Metal films, Surfaces, Sensitivity, Resistance, Electronic systems, Corrosion, Detection.

The work of the Air Force, Georgia Institue of Technology, Crest Instrument Division of Magna Products, Inc., and Forest Products Laboratory, was reviewed to establish the degree of sensitivity of electrical resistance corrosion indicators and their applicability to the evaluation of corrosion preventive oils and compounds. Laboratory work conducted under carefully controlled conditions indicated a high degree of sensitivity utilizing thin film indicators. The adaptation of the corrosometer, originally designed to utilize probe type specimens, to a glass slide having a thin metal film, provided a high degree of sensitivity.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

NAA-SR-6668 $2.60

Atomics International, Canoga Park, Calif.
ISOTOPE EFFECTS ACCOMPANYING USE OF TRITIUM AND DEUTERIUM IN THE STUDY OF ORGANIC RADIATION CHEMISTRY by J.G. Burr. Rept. on Contract AT(11-1)-GEN-8. 31 May 62, 28p. 40 refs.

TID-15664 $11.00

California U., Berkeley.
SYNTHETIC METHOD SOLUTION OF THE NEUTRON TRANSPORT EQUATION, by Harold John Kopp. Doctoral thesis. 148p. 43 refs.

NASA N62-12415 $1.60

Goddard Space Flight Center [National Aeronautics and Space Administration] Greenbelt, Md.
REENTRANT COSMIC RAY ALBEDO, by Ernest C. Ray. [1962] 11p. 5 refs.

HW-72199 $1.60

Hanford Atomic Products Operation, Richland, Wash.
APPLICATION OF THE CESIUM TETRAPHENYL-BORATE EXTRACTION TO THE MEASUREMENT OF URANIUM BURNUP, by A. C. Leaf. Rept. on Contract AT(45-1)-1350. Apr 62, 13p. 7 refs.

HW-SA-2536 $2.60

Hanford Atomic Products Operation, Richland, Wash.
RADIATION UNITS, by H.M. Parker and W.C. Roesch. Mar 62, 28p. 9 refs.

ORNL-TM-256 $1.10

Oak Ridge National Lab., Tenn.
CHEMICAL EFFECTS OF HIGH EXPLOSIVE SHOCK WAVES ON VARIOUS COMPOUNDS WHICH OCCUR IN THE GNOME CONTAINMENT MEDIUM, by W. D. Bond. 4 May 62, 7p. 4 refs.

TID-15211 $4.60

Pennsylvania State U., University Park.
LOW ENERGY NUCLEAR PHYSICS, by R. R. Roy. Progress rept. 1 June 61-31 May 62, on Contract AT(30-1)-2399. Feb 62, 47p. 23 refs.

NYO-9046 $1.60

Radiation Applications, Inc., Long Island City, N.Y.
DIFFUSION OF FISSION GASES THROUGH URANIUM OXIDE AND URANIUM CARBIDE, by J. J. Weinstock and A. P. Pinkerton. Semiannual progress rept. Dec 59-June 60, on Contract AT(30-1)-2497. 11 Aug 60, 16p. 15 refs. EURAEC-67.

TID-16079 $8.60

Purdue Research Foundation, Lafayette, Ind.
RESEARCH IN NUCLEAR PHYSICS. Progress rept. no. 12 on Contract AT(11-1)-123. 15 June 62, 96p. 64 refs.

TID-15683 $5.60

Washington U., Seattle.
BETA DOSIMETRY: THE POINT SOURCE FUNCTION FOR CARBON-14, by Adelbert H. Bigler. Master's thesis. 25 Sep 57, 51p. 5 refs.

GA-3211 $2.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
STEADY-STATE RELEASE FRACTION OF KRYPTON AND XENON FISSION PRODUCTS AT HIGH TEMPERATURES FROM (U, Th)C_2 GRAPHITE FUEL MATRIX IN OUT-OF-PILE EXPERIMENTS, by E. E. Anderson, P. E. Gethard, and L. R. Zumwalt. Rept. on Contract AT(04-3)-314. 15 June 62, 22p. 4 refs.

GEAP-3485 $12.00

General Electric Co., San Jose, Calif.
300 KWe CAPSULE NUCLEAR POWER PLANT STUDY. Final rept. on Contract AT(04-3)-189. 15 Aug 60, Rev. 15 Dec 60. 167p. 10 refs.

DC-61-2-46 $3.60

General Electric Co., Cincinnati, Ohio.
CONTINUOUS SIMULATION OF REACTOR POWER OVER MANY DECADES, by E. C. Eckert. Preliminary rept. on Contract AT(11-1)-171. 9 Feb 61, 39p. 4 refs.

DC-61-6-16 $5.60

General Electric Co., Cincinnati, Ohio.
D102A POWER PLANT DISASSEMBLY PROCEDURE, ed. by John W. McVey. Preliminary rept. on Contract AT(11-1)-171. 16 Oct 59, 56p.

APEX-459 $6.60

General Electric Co., Cincinnati, Ohio.
HAZARDS SUMMARY REPORT FOR SUSIE REACTOR, by C. W. Luke, D. L. Gilliland, and R. E. Baker. 3 Feb 59, declassified 25 May 59. 65p. 9 refs.

DC-52-5-41 $1.60

General Electric Co., Cincinnati, Ohio.
HYDROGENOUS SHIELD MATERIALS, by C. C. Thomas, Jr. 29 May 52, declassified 11 Sep 61. 15p.

DC-61-1-22 $1.60

General Electric Co., Cincinnati, Ohio.
INVESTIGATION OF THE EFFECTIVE THERMAL CONDUCTIVITIES FOR A FINNED COOLANT TUBE LITHIUM HYDRIDE SPECIMEN, by D. J. McKee. Preliminary rept. on Contract AT(11-1)-171. 3 Jan 61, declassified 31 Jan 61. 13p. 2 refs.

DC-61-2-98 $15.50

General Electric Co., Cincinnati, Ohio.
OTT IV AND V ACTIVATION TAPE DATA (AT-132), by E. White. Preliminary rept. on Contract AT(11-1)-171. 20 June 60, 193p.

DC-61-2-101 $3.60

General Electric Co., Cincinnati, Ohio.
POROUS SHIELD TESTS IN THE GE-OTT, CALCULATIONS AND ANALYSIS OF TEST DATA I, by F. Johnson. Preliminary rept. on Contract AT(11-1)-171. 19 Feb 60, 35p.

DC-61-2-97 $5.60

General Electric Co., Cincinnati, Ohio.
PROGRAM ODD: A ONE DIMENSIONAL MULTIGROUP REACTOR ANALYSIS PROGRAM FOR THE IBM-704, by P. G. Fischer, F. D. Wenstrup, and T. A. Hoffman. Preliminary rept. on Contract AT(11-1)-171. 10 Feb 61, 61p. 4 refs.

DC-55-6-7 $15.50

General Electric Co., Cincinnati, Ohio.
PROJECT 100 TASK REPORTS. Preliminary rept. for period ending 31 June 55, on Contract AT(11-1)-171. June 55, declassified 26 July 61. 234p.

APEX-111 $9.10

General Electric Co., [Cincinnati] Ohio.
SUMMARY HAZARDS REPORT FOR LOW POWER TESTS WITH THE R-1 REACTOR, ed. by G. P. Kerr. Oct 52, declassified 23 Aug 61. 100p.

PB 160 824 $21.00

Gilbert Associates, Inc., Reading, Pa.
RELIABILITY OF STUDY EQUIPMENT AND COMPONENTS IN NUCLEAR POWER PLANTS. Final engineering rept. on Contract AF 30(602)2017. July 60, 378p. GAI rept. no. 1512; RADC-TR-60-137; AD-241 088.

DESCRIPTORS: *Nuclear power plants, *Boiling water reactors, *Power reactors, Reliability, Military requirements, Instrumentation, *Reactor feasibility studies.

The operating experience at five nuclear power plants was reviewed and analyzed. The various events recorded were separated into categories by the nature and severity of event occurrence and by the type of equipment or component involved. The troubles encountered are discussed by type category, and certain general and specific recommendations concerning reliability improvement are made. More than 1800 events have been reviewed. Of these, nearly 300 caused unscheduled loss of load by the plant involved. Most of these unscheduled load loss troubles and many of the other events events are discussed in the report. All of the events reviewed are included in the Lists of Events which are part of the Appendix.

HW-71684 $3.60

Hanford Atomic Products Operation, Richland, Wash.
A COLLECTION OF BOILING HEAT TRANSFER AND BURNOUT CORRELATIONS, by C. W. Woodson and J. M. Batch. 4 Nov 61, 37p. 30 refs.

ACNP-5905 $26.00

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
PATHFINDER ATOMIC POWER PLANT. SAFEGUARDS REPORT. Rept. on Contract AT(11-1)-589. 15 Jan 62, 342p. Prepared in cooperation with Northern States Power Co., Minneapolis, Minn.

ACNP-6121 $4.60

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
PATHFINDER ATOMIC POWER PLANT. SUPPLEMENTAL TECHNICAL INFORMATION. COMPONENTS OF THE PATHFINDER REACTOR TO BE FABRICATED OF PRECIPITATION HARDENED STAINLESS STEELS. Rept. on Contract AT(11-1)-589. 37p. Prepared in cooperation with Northern States Power Co., Minneapolis, Minn.

BAW-1224 $1.60

Babcock and Wilcox Co., Lynchburg, Va.
STUDY S-R-99: FEASIBILITY OF MECHANICAL CONTROL FOR THE ADVANCED TEST REACTOR, by S. W. Spetz and W. K. Luckow. Rept. on Contract AT(10-1)-1075. Sep 61, 14p. 2 refs. IDO-24038.

BMI-X-186 $1.10

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF URANIUM MONONITRIDE, by Donald L. Keller. Quarterly progress rept. Oct-Dec 61, on Contract W-7405-eng-92. 1 Jan 62, 5p. EURAEC-260.

PB 160 817 $10.10

Blaw-Knox Co., Pittsburgh, Pa.
INVESTIGATION AND STUDY OF PRIMARY LOOP IMPROVEMENTS FOR NUCLEAR POWER PLANTS. Rept. for 11 Feb-11Dec 59, on Contract AF 30(602)2006. Dec 59, 122p. RADC-TR-59-235; AD-232 073.

DESCRIPTORS: *Nuclear power plants, Power reactors, Pressurized water reactors, Boiling water reactors, Design, Pipe fittings, Gaskets, Valves, Pumps, Materials, Corrosion research

Design and selection features are reviewed for pipe connectors and gaskets, valves, circulating pumps, and pipe material pertaining to the primary loop of a prepackaged nuclear power plant. Limitations of size and weight for air transport, and factors of field assembly and dis-assembly are discussed. Discussion of primary coolants indicated that the pressurized water or boiling water cycles are preferred. Pipe connectors with related gasket types are discussed. Two-bolt connectors with special forms of metallic gaskets are recommended in preference to standard ASA flanged joints. Zero leakage and controlled leakage valves are described. Valve operating and control systems are discussed outlining factors of dependability and the effect of total leakage on design of auxiliary water system. Circulating pumps of conventional design are compared with canned rotor pumps on the basis of leakage rates, dependability, maintenance and cost. Factors affecting corrosion are emphasized. Induced radioactivity on the secondary effects on corrosion products is discussed. (Author)

ORO-552 $2.60

Brush Beryllium Co., Cleveland, Ohio.
HELICAL FINNED TUBE DEVELOPMENT, by E. A. Murphy and J. G. Klein. Quarterly rept. 16 Jan-15 Apr 62, on Contract AT(40-1)-2912. 15 Apr 62, 23p. Technical rept. no. 258-235.

CEND-116 $5.60

Combustion Engineering, Inc., Windsor, Conn.
EVALUATION OF STEAM SEPARATION REQUIREMENTS FOR LARGE INTEGRAL BOILER SUPERHEATER REACTORS, by J. S. Hucks and V. C. Hall, Jr. Rept. on Contract AT(11-1)-795. Dec 60, 52p. 24 refs.

DLCS-2150201 $3.60

Duquesne Light Co., Shippingport, Pa.
CORE REMOVAL COOLING SYSTEM. SECTION II. CORE I, SEED I. 19 May 61, 31p. T-641113.

TID-15438 $4.60

Duquesne Light Co., Shippingport, Pa.
MONTHLY OPERATING REPORT, December, 1961. Rept. on Contract AT(11-1)-292. 24 Jan 62, 43p.

TID-15224 $4.60

Duquesne Light Co., Shippingport, Pa.
MONTHLY OPERATING REPORT, FEBRUARY, 1962. Rept. on Contract AT(11-1)-292. Mar 62, 42p.

DLCS-5000462 $4.60

Duquesne Light Co., Shippingport, Pa.
MONTHLY OPERATING REPORT, April 1962, rept. on Contract AT(11-1)-292. 49p.

GA-2510 $2.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
NEUTRON THERMALIZATION MEASUREMENTS USING AN ELECTRON LINEAR ACCELERATOR, by J. R. Beyster. Rept. on Contract AT(04-3)-167. 10 Apr 62, 30p. 10 refs.

GAMD-2221 $1.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
PROCEDURES FOR THE PREPARATION OF GRAPHITE MATRIX FUEL COMPACTS CONTAINING CARBON COATED (Th, U)C_2 FUEL PARTICLES, by W. V. Goeddel. Rept. on Contract AT(04-3)-314. 27 Apr 61, 16p. 5 refs.

GAMD-2408 $1.10

General Atomic Div., General Dynamics Corp., San Diego, Calif.
SIGMA-GAS: 7090 VERSION, by J. Bell. Rept. on Contract AT(04-3)-314. 17 July 61, 3p.

NMI-7251 $3.60

Nuclear Metals, Inc., Concord, Mass.
POWER REACTOR PROGRAM, by S. Isserow, R. W. Anderson and others. Progress rept. 1-31 May 62. 26 June 62, 32p. 2 refs.

ORNL-TM-239 $2.60

Oak Ridge National Lab., Tenn.
EFFECT OF URANIUM BEARING SCALE DEPOSITS ON HRE-2 CORE WALL TEMPERATURE, HEAT FLUX AND PATCH TEMPERATURE, by C. G. Lawson and F. N. Peebles. 29 May 62, 26p. 11 refs.

ORNL-TM-250 $2.60

Oak Ridge National Lab., Tenn.
IN-PILE GAS-COOLED FUEL ELEMENT TEST FACILITY, by J. Zasler, W. R. Huntley and others. 10 July 62, 31p. 8 refs.

ORNL-TM-108 $10.10

Oak Ridge National Lab., Tenn.
PRELIMINARY DESIGN OF A HYDROGEN-COOLED IN-PILE LOOP FOR THE EGCR, by C. Michelson, A. W. Culp, and F. H. Neill. Rept. on Contract W-7405-eng-26. 12 July 62, 117p. 9 refs.

ORNL-TM-257 $2.60

Oak Ridge National Lab., Tenn.
PROCESS DESIGN SECTION STATUS REPORT FOR APRIL 1962, by H. E. Goeller. 31 May 62, 28p.

ORNL-TM-189 $1.60

Oak Ridge National Lab., Tenn.
REACTIVITY CALIBRATIONS AND FISSION RATE DISTRIBUTIONS IN AN UNMODERATED, UNREFLECTED URANIUM MOLYBDENUM ALLOY RESEARCH REACTOR, by J. T. Mihalczo. 10 May 62, 19p. 3 refs.

ORNL-TM-258 $1.60

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A STUDY OF THE VISCOSITY OF THORIA SOLS, by E. Sturch. 13 June 62, 18p. 10 refs.

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TESTS OF BEARING MATERIALS FOR THE EXPERIMENTAL THROUGH-TUBES IN THE EGCR, by R. E. MacPherson and A. M. Smith. Rept. on Contract W-7405-eng-26. 16 July 62, 29p.

ORNL-TM-241 $11.50

Oak Ridge National Lab., Tenn.
THORIUM UTILIZATION PROGRAM: A SURVEY OF PROCESSING METHODS FOR THORIUM REACTOR FUELS, by W. L. Carter. Rept. on Contract W-7405-eng-26. 12 July 62, 159p. 22 refs.

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Pratt and Whitney Aircraft Div., United Aircraft Corp., Eastford, Conn.
DESIGN PROCEDURE FOR SODIUM TO NaK HEAT EXCHANGER, by H. C. Hopkins. Rept. on Contract AT(11-1)-229. 25 Feb 54, declassified 9 May 61. 48p. FXM-669.

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Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
FORCED CONVECTION LIQUID METAL INPILE LOOP HYDRODYNAMIC TEST OF THE LIQUID METAL CIRCUIT, by C. R. Nelson and J. M. Reynolds. 5 Dec 58, declassified 9 May 61. 26p.

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Pratt and Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn.
IRRADIATION OF FUEL SANDWICH IN MTR, by E. West and J. Lamarsh. 8 May 53, declassified 9 May 61. 10p.

FXM-479 $1.10

Pratt and Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn.
MODERATOR FLOW SCHEMES WITH REDUCED DENSITY VARIATION, by A. I. Chalfant. 13 Aug 53, declassified 9 May 61. 7p.

FXM-429 $4.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn.
RADIATION HEATING IN THE SCW REACTOR, by John A. Riley. 29 May 53, declassified 9 May 61. 58p.

SRO-68 $1.60

Savannah River Operations Office, Ga.
HEAVY WATER POWER REACTOR PROGRAM. Monthly progress rept. May 62, 12p.

TID-15979 $1.10

Southwest Research Inst., San Antonio, Tex.
CYCLIC PRESSURE TESTS OF LARGE SIZE PRESSURE VESSELS, by A. G. Pickett and C. L. Whitney. Progress rept. no. 42 on Contract AT(30-1)-2140. 15 May 62, 6p.

TID-16083 $6.60

Stanford Linear Accelerator Center, Stanford U., Calif.
TWO MILE ACCELERATOR PROJECT. Status rept. 1 Jan-31 Mar 62, on Contract AT(04-3)-363. Apr 62, 61p. 10 refs. M-298.

HW-72322 $1.60

Hanford Atomic Products Operation, Richland, Wash. FUEL ELEMENT STATISTICS FROM THE QUALITY CERTIFICATION PROGRAM, bv L. T. Hagie and J. L. Jaech. 16 Jan 62, 13p.

HW-73314 $1.10

Hanford Atomic Products Operation, Richland, Wash. HANFORD STUDIES EXECUTED FOR THE USAEC AECL COOPERATIVE PROGRAM ON DEVELOPMENT OF HEAVY WATER MODERATED POWER REACTORS, comp. by S. Goldsmith. Monthly progress rept., Mar 62. 9 Apr 62, 6p.

HW-SA-2058 $1.60

Hanford Atomic Products Operation, Richland, Wash. PCTR MEASUREMENT OF THE EGCR CONTROL ROD STRENGTH, by P. F. Nichols, T. J. Oakes, and R. E. Heineman. 17p. 4 refs.

HW-68021 $1.60

Hanford Atomic Products Operation, Richland, Wash. SHIELDING REQUIREMENTS FOR NPR PRODUCTION IN PLUTONIUM RECLAMATION FACILITY, by H. A. Moulthrop. 5 Jan 61, 13p.

HW-SA-2583 $12.00

Idaho U., Moscow.
A STUDY OF PROPERTIES RELATED TO FEASIBILITY OF USING BORON STEEL FOR NUCLEAR REACTOR THERMAL SHIELDING, by George Toralf Haugland. Master's thesis. 1962, 161p. 60 refs.

TID-15477 $11.00

Jackson and Moreland, Inc., Boston, Mass.
PM-3A NUCLEAR POWER PLANT ACTIVATION OF SECONDARY SHIELDING MATERIAL AND LEACH WATER, by A. F. Kalfopulos and P. Jalichandra. Final rept. on Contract AT(30-1)-2749. Apr 62, 150p. 7 refs.

TID-16013 $1.60

Laboratories for Applied Sciences, U. of Chicago, Ill. RADIOISOTOPES RESEARCH, DEVELOPMENT, AND RELATED ACTIVITIES. Quarterly progress rept. 15 Dec 61-15 Mar 62, on Contract AT(11-1)-712. 17p. LAS-SR-161-43.

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National Bureau of Standards, Washington, D. C. STRUCTURE SHIELDING AGAINST FALLOUT RADIATION FROM NUCLEAR WEAPONS, by L. V. Spencer. 1 June 62, 134p. 41 refs. NBS Monograph 42.

DESCRIPTORS: *Nuclear weapons, *Radioactive fall-out, *Shielding, Gamma rays, *Shelters, Air raid shelters, Radioactive isotopes, Cobalt, Cesium, Fission products, Penetration, Nuclear explosions, Underground structures, Foundations

The theory of structure shielding from fallout gamma radiation is developed to the point of applications to elementary structure types. Examples discussed in the text include the density interface, foxhole, shielded foxhole or basement, light superstructure, vertical wall, blockhouse, vents, compartmentalization effects, and mazes. A large number of engineering charts and graphs are presented for engineering calculations, including many obtained from angular distributions of the exposure dose. Results are given for a fission spectrum, and for Co^{60} and Cs^{137} sources. This information has been obtained almost completely by machine calculations utilizing basic cross section data. A number of sources of experimental data are mentioned, but detailed comparisons with experiment are not included. (Author)

PB 160 783 $4.60

Nepa Div., Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.
COMPOUNDS OF LIGHT ELEMENTS FOR USE AS MODERATORS, by M. E. Lee. 11 Apr 49, declassified 16 Aug 61. 42p. 260 refs. Rept. no. NEPA 947-SCR-47.

DESCRIPTORS: *Reactor moderators, *Materials, Aluminum compounds, Beryllium compounds, Carbides, Flourides, Nitrides, Oxides, Lithium compounds, Magnesium compounds, Synthesis, Physical properties, Chemical properties, Alloys.

A literature search was conducted to compile data concerning the physical and chemical properties and methods of synthesizing compounds, alloys or systems composed of two or more of the elements aluminum, beryllium, carbon, nitrogen, oxygen, fluorine and magnesium for possible use as moderators in high temperature reactors. Thermal stability was used as a limiting factor and, with the exception of a few combinations of interest for other reasons, a melting point of above 1000°C. (1832°F.) was required for inclusion.

PB 160 784 $1.60

Nepa Div., Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.
PRELIMINARY INVESTIGATION OF THE SOLUBILITY OF METALLIC ELEMENTS IN BISMUTH, by J. W. Johnson. 17 Nov 49, declassified 16 Aug 61. 17p. 4 refs. Rept. no. NEPA 1221-SCR-54.

DESCRIPTORS: *Reactor coolants, Materials, *Bismuth, *Liquid metals, Chromium, Niobium, Iron, Molybdenum, Nickel, Solubility, *Metals

A preliminary investigation of the solubility of chromium, columbium, iron, molybdenum, and nickel in liquid bismuth at 482°C (900°F), 732°C (1350°F), and 1010°C (1850°F), for periods of time of 4, 24, and 100 hours has been conducted. At 100 hours the temperature coefficient of solubility over the range studied for chromium was computed to be 0.05 ppm/°F, for columbium, 0.17 ppm/°F, for iron, $6.2 \times 10^{-4}T - 0.18$ (T = °F) ppm/°F, for molybdenum, < 0.001 ppm/°F, and for nickel, 7.1×10^{-3}% /°F.

Radioactivity

NSEC-48 $3.60

Nuclear Science and Engineering Corp., Pittsburgh, Pa.
METEOROLOGICAL EVALUATION OF RADIOACTIVE FALLOUT, by Leonard P. Salter, Paul Kruger, and Charles L. Hosler. Rept. on Contract AT(30-1)-2588. 31 May 61, 39p. 10 refs.

TID-15659 $1.60

Purdue U., Lafayette, Ind.
A 2 Pi LIQUID SCINTILLATION COUNTER FOR DETERMINING THE RADIOACTIVITY OF LARGE SAMPLES INCLUDING MAN AND ANIMALS, by J. E. Christian, W. V. Kessler, and P. L. Ziemer. Rept. on Contract AT(11-1)-876. [1960] 18p. 6 refs.

TID-14960 $2.60

Reynolds Electrical and Engineering Co., Inc., Mercury, Nevada.
KIWI-A^3 PLAN 216-B. ON-SITE RAD-SAFE REPORT. Apr 61, 28p.

Waste Disposal

HW-64292 $1.10

Hanford Atomic Products Operation, Richland, Wash.
DISPOSAL OF RADIOACTIVE LIQUID WASTES FROM 300 AREA LABORATORY FACILITIES, by W. A. Haney. Rept. on Contract AT(45-1)-1350. 14 Mar 60, 11p. 6 refs.

HW-69225 $1.10

Hanford Atomic Products Operation, Richland, Wash.
MINERAL ADSORPTION OF RADIONUCLIDES IN REACTOR EFFLUENT, by D. W. Bensen. Rept. on Contract AT(45-1)-1350. 6 Apr 61, 6p. 2 refs.

NYO-9653 $8.10

Sedgwick Labs. of Sanitary Science, Mass. Inst. of Tech., Cambridge.
THE EFFECTS OF AN ELEVATED TEMPERATURE AND PRESSURE ENVIRONMENT UPON VITREOUS FUSIONS CONTAINING RADIOACTIVE WASTES, by C. J. Touhill, D. L. Ketcham, and R. Eliassen. Rept. June 60-Sep 61, on Contract AT(30-1)-621. 31 Aug 61, 87p. 25 refs.

PHYSICS

PB 160 837 $2.60

Bausch and Lomb, Inc., Rochester, N. Y.
STUDIES OF SEMICONDUCTOR FILMS, by L. Bartle, C. F. Mooney, and A. Francis Turner. Quarterly technical rept. no. 1, 23 Apr-22 July 54, on Contract DA 44-009-eng-2117. 30 Aug 54, 25p. AD-48 414.

DESCRIPTORS: *Semiconducting films, *Photoconductive films, Germanium, Cryolite, Sodium compounds, Aluminum compounds, Fluorides, *Infrared filters, Spectrographic analysis.

An investigation is being made of the preparation and properties of semiconductor films for use in multilayer IR transmission filters and as photoconductors. Basic experimental information on single films is to be obtained in regard to mechanical stresses, optical constants, and photoconductive response. A supporting program of instrumentation is to be conducted, a major part of which will be the construction of a near-IR spectrophotometer utilizing wedged interference filters as the wave length selective elements. A preliminary survey was made of stresses exerted by germanium, cryolite, and sodium aluminum fluoride films; the stress in the deposited films was measured indirectly by observing the bending of a cylindrical glass fiber when only 1 side of the fiber had been coated.

UCRL-5926 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
THE STATE OF MATTER AT HIGH PRESSURES, by Zanier D. Lane. A bibliography, 1950-October 1959. 1 Apr 60, 18p.

TID-15190 $1.60

Los Alamos Scientific Lab., N. Mex.
LAMINAR FLOW THROUGH CHANNELS WITH POROUS WALLS, comp. by Helen S. Stearns. 22 July 59, 15p. 80 refs.

NYO-7885 $2.60

Princeton U., N. J.
DOPPLER BROADENING OF THE He^+ 4686 LINE IN ION TEMPERATURE MEASUREMENTS, by K. E. Weimer. Technical memo. no. 42 on Project Matterhorn, Contract AT(30-1)-1238. Jan 57, 26p. 8 refs.

NYO-10232 $5.60

Rochester U., N. Y.
SOME CONSEQUENCES OF ANALYTICITY AND UNITARITY CONDITIONS IN SCATTERING PROBLEMS (I), by Susumu Okubo. Rept. on Contract AT(30-1)-875. 18 May 62, 58p. 24 refs.

NYO-10233 $2.60

Rochester U., N. Y.
THE STUDY OF SPURIOUS SCATTERING IN NUCLEAR EMULSIONS AND THE EFFECT OF HIGHER ORDER DIFFERENCES IN SCATTERING MEASUREMENTS, by P. J. Lavakare and E. C. G. Sudarshan. Rept. on Contract AT(30-1)-875. 21 May 62, 29p. 8 refs.

AD-275 837 $8.10

Stanford Electronics Labs., Stanford U., Calif.
WHISTLER-MODE PROPAGATION STUDIES USING NAVY VLF TRANSMITTERS, by R. A. Helliwell, J. Katsufrakis, and G. Carpenter. Technical rept. no. 1, Oct 58-Nov 61, on Contract Nonr-225(27). Mar 62, 90p. 14 refs. Rept. no. SEL-62-035.

UNC-1001 $1.60

United Nuclear Corp., Hematite, Mo.
CHARACTERIZATION OF UO_2 POWDERS, by James F. Carpenter, Carl W. Kuhlman and Robert A. Nelson. Quarterly rept. no. 5, 10 Oct 61-10 Jan 62, on Contract AT(40-1)-2699. 17p.

NDA-2164-3 $17.50

United Nuclear Corp., White Plains, N. Y.
AN EVALUATION OF U^{233} THORIUM FAST BREEDER POWER REACTORS, by R. Hankel. Rept. on Contracts AT(30-1)-2303(VIII) and AT(30-1)-2830. 15 Apr 62, 280p. 74 refs.

GEAP-3771-2 $4.60

Vallecitos Atomic Lab., Pleasanton, Calif.
HIGH PERFORMANCE UO_2 PROGRAM, by B. Weidenbaum. Quarterly progress rept. no. 2, July-Sep 61, on Contract AT(04-3)-189. 1 Oct 61, 45p. 2 refs. EURAEC-170.

TID-15913 $9.60

Westinghouse Electric Corp., Cheswick, Pa.
12-INCH SODIUM FLOW CONTROLLER. Rept. on Contract AT(11-1)-681. 112p. Technical Manual 20357.

CVNA-138 $6.60

Westinghouse Electric Corp., Pittsburgh, Pa.
CVTR CONTROLLED PLANT STUDY, by H. H. Norman and J. M. Gallagher, Jr. Mar 62, 64p. 2 refs.

CVNA-121 $12.00

Westinghouse Electric Corp., Pittsburgh, Pa.
DEVELOPMENT OF CVTR CONTROL RODS AND DRIVE MECHANISMS, by H. W. Keller, H. N. Andrews and others. Rept. on Contract AT(30-1)-2289. June 62, 164p. 11 refs.

CVNA-108 $6.60

Westinghouse Electric Corp., Pittsburgh, Pa.
DEVELOPMENT OF THE CVTR MODERATOR TANK, by J. Godts, D. R. Thomas, and J. N. Ellyson. Aug 61, 60p.

CVNA-117(Vol. II) $11.50

Westinghouse Electric Corp., Pittsburgh, Pa.
A DIGITAL COMPUTER ANALYSIS OF LOSS-OF-COOLANT ACCIDENT FOR A MULTI-CIRCUIT CORE NUCLEAR POWER PLANT, (ALPS CODE) by Amir N. Nahavandi, William A. Webb and others. Feb 62, 153p.

CVNA-117 (Vol. 1) $8.60

Westinghouse Electric Corp., Pittsburgh, Pa.
A DIGITAL COMPUTER ANALYSIS OF LOSS-OF-COOLANT ACCIDENT FOR A MULTI-CIRCUIT CORE NUCLEAR POWER PLANT (ALPS CODE) by Amir N. Nahavandi, William A. Webb and others. Feb 62, 92p. 9 refs.

Nuclear Reactions

WAPD-T-1474 $2.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
COMPUTATION SCHEMES FOR REACTOR THERMAL TRANSIENTS, by Garrett Birkhoff and Thomas F. Kimes. Rept. on Contract AT(11-1)-Gen-14. Apr 62, 24p. 13 refs.

XDC-61-4-35 $4.60

General Electric Co., Cincinnati, Ohio.
NEUTRON CROSS SECTIONS FOR RHODIUM AND TANTALUM, by Jacob W. Zwick. Rept. on Contract AT(11-1)-171. 4 Apr 61, 46p. 31 refs.

HW-SA-2586 $8.60

Idaho U., Moscow.
AN ANALYSIS OF THE EFFECTS OF FAST NEUTRON-INDUCED FISSION IN A TWO-REGION NUCLEAR REACTOR FUEL ELEMENT, by John Richard Lilley. Master's thesis. 31 May 62, 91p. 31 refs.

SUI-61-5 $4.60

Iowa State U., Iowa City.
GAMMA RAY TRANSITIONS FROM EXCITED STATES, OF S^{32}, by Larry Dale Schlenker. Master's thesis. June 61, 52p. 16 refs.

CNLM-3244 $1.60

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
AN ANALYSIS OF INCONSISTENCIES IN REMOVAL CROSS SECTIONS OF CARBON AND OXYGEN. 20 Jan 61, 12p. 4 refs.

NYO-10036 $3.60

Rochester U., N. Y.
THE NUCLEON-NUCLEON INTERACTION AT ABOUT 210 MEV. A SURVEY OF THE RESULTS AND ANALYSIS OF SCATTERING EXPERIMENTS PERFORMED AT ROCHESTER, by John Tinlot. 24 Jan 62, 36p. 15 refs.

NYO-10235 $2.60

Rochester U., N. Y.
A STATISTICAL MODEL, INCLUDING NEW PARTICLE RESONANCES, AS APPLIED TO $\bar{\Lambda}$ - p ANNIHILATION, by M. E. Arons. Rept. on Contract AT(30-1)-875. 12 June 62, 23p. 13 refs.

Experiments were conducted to determine the effect of time on response to magnetic annealing. For the intervals investigated (up to 250 hr), the saturation (Bs) and residual induction (Br) gradually increased with annealing time until they leveled off from 100 to 250 hr with a Br/Bs ratio of 0.85 for the material annealed with the magnetic field. Coercive force values of 50% Fe-50% Co alloys increased to a maximum in the neighborhood of 10 hr and then dropped with further annealing. The investigations of the effect of reduction of impurities in 50% Fe-50% Co rings were temporarily discontinued as the thin rings employed showed no response to magnetic annealing. The experimental work designed to develop unoriented magnetic materials with high induction in the range of 10-100 oersteds was extended to Fe-Sb and Fe-Ce alloys. Both systems produced alloys with higher magnetization curves at low fields than the USS pure Fe curve used as a base. In the case of the Sb alloys, the improvement was approximately 900 gauss at 10 oersteds and 250 gauss at 100 oersteds. Improvements with Ce were slightly greater at all inductions than with the Sb. The Ce alloy also responded to magnetic annealing and yielded a Br/Bs ratio of approximately 0.8 on the initial magnetic annealing experiments with this alloy. For the equiatomic per cent Mn-Sb alloy, values of $(B-H)_{H=4000}$ of approximately 6300 gauss were obtained. (See also PB 160 800)

PB 160 802 $6.60

Institute of Research, Lehigh U., Bethlehem, Pa.
IMPROVED MAGNETIC MATERIALS, by George P. Conard, II. Final rept. 15 Oct 50-15 July 53, on Contract DA 36-039-sc-61. 15 July 53, 63p. 25 refs. AD-17 506.

DESCRIPTORS: *Magnetic materials, *Magnetic alloys, Design, Magnetic properties, *Magnetostriction, Measurement, Iron alloys, Cobalt alloys

Experiments were continued on the effect of time of magnetic application on the response of a 50% Fe-50% Co alloy to magnetic annealing. Results indicated that the field had the greatest effect during cooling. Optimum magnetic properties were produced with long aging times which seemed to develop a high degree of crystal order. The improvement on the As, Sb, and Ce-Fe alloys appeared to be a result of the production technique. Fe-Ce alloys exhibited higher induction at fields of 10 and 100 oersteds than pure Fe rings. Attempts to destroy preferred orientation in the latter decreased the residual induction, but did not change the induction at 10 and 100 oersted. Maximum magnetic induction values were obtained on the Mn side of the theoretical composition of MnSb; optimum magnetic properties, obtained with 32.5% Mn and 67.5% Sb, were B = 6600 gauss, Br = 1900 gauss, and Hc = 10 oersteds. (See also PB 160 801)

PB 160 798-8 $2.60

Institute of Research, Lehigh U., Bethlehem, Pa.
MAGNETIC MATERIALS RESEARCH, by George P. Conard, II. Quarterly rept. no. 8, 16 May-15 Aug 60, on Contract DA 36-039-sc-78092. 24 Sep 60, 23p. 2 refs. AD-245 546.

DESCRIPTORS: *Magnetic materials, Magnetic alloys, *Magnetostriction, *Thin films, Cobalt, Iron alloys, Nickel alloys, Manganese alloys, Silicon alloys

Preparations continue for the high temperature magnetostriction studies of Fe-Si alloys. Investigations of the Fe-Si system and of Mn base alloys continue. Co and Fe-Co films deposited from the metal acetonates, as well as Fe-Ni electrodeposited films continue to show erratic properties. (Author)

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National Bureau of Standards, Washington, D. C.
BASIC MAGNETIC QUANTITIES AND THE MEASUREMENT OF THE MAGNETIC PROPERTIES OF MATERIALS, by Raymond L. Sanford and Irvin L. Cooter. 21 May 62, 36p. 32 refs. NBS Monograph 47.

DESCRIPTORS: *Magnetic materials, Ferromagnetic materials, Magnetic properties, Magnetic fields, Ferrites, Permeability, Magnetic susceptibility, Magnetic cores, Test methods.

This paper gives general information regarding the two basic quantities, magnetic induction, B, and magnetizing force, H, and also the magnetic constant Γ_m (often designated by the symbols μ_v and μ_o). Information is also given regarding the magnetic properties of various materials and methods and apparatus commonly used in the Magnetic Measurements Section for measuring these properties by means of reversed direct current or alternating currents of low frequency. Magnetic measurements peculiar to high frequencies are not discussed. In view of the gradual adoption of the rationalized mksa system of units, this system is included as well as the classical cgs electromagnetic system. (Author)

AD-259 564 $10.10

Westinghouse Research Labs., Pittsburgh, Pa.
THERMOELECTRICITY. Quarterly progress rept. no. 4 on Contract NObs-78365. [1960] 126p. 11 refs. Research memo. 401FR800-M2; Research rept. 414FR801-R1; Scientific paper 414FR803-P2.

DESCRIPTORS: *Thermoelectricity, Alloys, Measurement, Materials, Impurities, Thermal conductivity, Mechanical properties, Electrical properties, Thermodynamics, Generators, Power supplies, *Semiconductors, Tests.

The efficiency charts have been unchanged during this quarter. There have been small improvements in efficiencies of ZnSb and the quaternary Bi, Sb, Se, Te alloys. Preliminary results on alloys of the form $(Ag_2Te_2)(Sb_2Te_3)$ indicate these materials will be considerably better than ZnSb over its whole temperature range. However, because of the difficulties of measuring such low thermal conductivities by relative methods, these data will not be included until absolute measurements have been completed over most of the temperature range. Another useful thermoelectric material, Te doped $CoSb_3$ has been developed. This material has nearly as high a differential efficiency as PbTe and appears to have considerably better mechanical properties than PbTe. The survey of compounds having cubic or near cubic structures has been continued. (See also PB 160 838-3)

DESCRIPTORS: *Radio transmission, *Radio waves, *Ionospheric propagation, Atmospherics, *Very low frequency, *Wave transmission, *Echo ranging, *Radio transmitters, Radio receivers, Narrowband, Loop antennas, Frequency shift keyers, Data processing systems, Aurorae, Pulse transmitters, Radio signals, Signal-to-noise ratio, Magnetic fields, Electromagnetic wave reflections, Propagation

The operation and results of an experiment to observe whistler-mode echoes from U. S. Navy VLF transmitters are described. Data cover the period from October 1958 to November 1961, depending upon the station, and include mainly transmissions from NSS (15.5 kc) and NPG (18.6 kc). Receivers were located at Stanford, California; Greenbank, West Virginia; Ushuaia, Argentina; Byrd Station, Antarctica. The types of echoes observed from the pulse transmissions are illustrated, with photographic presentations of group delay vs time. Six types of echo are identified. A major observation is that echo activity occurs almost solely during local nighttime hours. Group delays increased with the geomagnetic latitude of the receiver and showed significant reduction during magnetic storms. Correlation of echo occurrence and group delay between different receiving stations was low. Echo occurrence showed large day-to-day variation and did not correlate well with whistler occurrence.

PB 160 827 $2.60

Stevens Inst. of Tech., Hoboken, N. J.
INVESTIGATION OF PLASMA ACCELERATION, by K. C. Rogers, G. Brucker and others. Quarterly progress rept. no. 5, 1 July-31 Sep 59, on Contract DA 36-039-sc-78097. [1959] 22p. AD-231 905.

DESCRIPTORS: *Betatrons, Design, *Plasma physics, Electron tubes.

The closing delay time of high current vacuum-gap switches used in conjunction with the megatron accelerator and fast capacitor bank was measured as a function of pressure in the gap and voltage across the gap. Operation at a pressure of 0.5 μ Hg is reliable, independent of pressure, and results in a closing time jitter of 0.05 μsec. (Author) (See also PB 153 934)

SIT-P57 $1.60

Stevens Inst. of Tech., Hoboken, N. J.
PLASMA ACCELERATION EXPERIMENTS, by J. E. Nankivell. Annual rept. on Contract AT(30-1)-1921. Jan 62, 21p.

TID-15684 $3.60

Vanderbilt U., Nashville, Tenn.
THE ELECTRON SPECTRUM OF MERCURY-203 FROM 50 KEV. TO 300 KEV, by Audley O. Burford. Thesis. June 53, 39p. 62 refs.

Acoustics

DC-61-3-743 $3.60

General Electric Co., Cincinnati, Ohio.
INVESTIGATION OF INDUCED NOISE ATTENUATION TECHNIQUES IN PULSE DETECTION SYSTEMS, by T. B. Klingler. Preliminary rept. on Contract AT(11-1)-171. 30 Mar 61, 41p.

SCTM-161-60(24) $1.60

Sandia Corp., Albuquerque, N. Mex.
EFFECTS OF REVERSED BIAS ON NOISE LEVELS AND TRANSISTOR PARAMETER VARIATIONS IN DIGITAL SYSTEMS, by R. D. Moyer. 20 June 60, 19p. 9 refs.

Electricity and Magnetism

PB 160 800 $3.60

Institute of Research, Lehigh U., Bethlehem, Pa.
IMPROVED MAGNETIC MATERIALS, by George P. Conard, II. Quarterly progress rept. no. 9, 15 Oct 52-15 Jan 53, on Contract DA 36-039-sc-61. 15 Jan 53, 36p. 11 refs. AD-3146

DESCRIPTORS: *Magnetic materials, *Magnetic alloys, Design, Magnetic properties, *Magnetostriction, Measurement, Iron alloys, Cobalt alloys, Forging, Magnetic fields

For times up to two hours, the magnetic properties of the magnetically annealed rings show a continuous improvement with increased time of anneal. Preliminary investigations on the effect of deformation on the response to magnetic annealing indicate that fairly high degrees of forging do not impair the response to magnetic annealing, while intermediate forging reductions markedly decrease the response. Experimental work designed to develop unoriented material with high inductions at fields of 10-100 oersteds was concentrated on further investigations of the iron-arsenic alloys. Work on permanent magnet alloys appears to indicate that the loss of response to magnetic annealing as V is added to the Fe-Co-Ni alloys may be at least partially due to the decrease in ease of magnetization of the alpha phase with the addition of vanadium. Vanadium additions also tend to make the gamma phase non-magnetic. Magnetostriction measurements have been made on three ferrite rings. (See also PB 107 818)

PB 160 801 $3.60

Institute of Research, Lehigh U., Bethlehem, Pa.
IMPROVED MAGNETIC MATERIALS, by George P. Conard, II. Quarterly progress rept. no. 10, 15 Jan-15 Apr 53, on Contract DA 36-039-sc-61. 15 Apr 53, 39p. 15 refs. AD-11 511.

DESCRIPTORS: *Magnetic materials, *Magnetic alloys, Design, Magnetic properties, *Magnetostriction, Measurement, Iron alloys, Cobalt alloys.

TID-15620 $4.60

Temple U., Philadelphia, Pa.
SPECTRAL REFLECTIVITY AS A FUNCTION OF TEMPERATURE OF β-BRASS TYPE ALLOYS, by L. Muldawer. Declassified 1 May 62. 41p. 34 refs.

Solid State Physics

PB 160 812 $4.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
POSSIBLE EQUATIONS TO DESCRIBE TRANSIENT STRESS, STRAIN AND TEMPERATURE FIELDS IN VISCOELASTIC SOLIDS, by S. C. Hunter. Technical rept. no. 2 on Contract NOrd-18594. Jan 60, 44p. AD-231 776.

DESCRIPTORS: *Solids, *Stresses, Mathematical analysis, Transients, Elasticity.

A complete set of equations is derived, governing the propagation of stress, strain, and temperature transients in viscoelastic solids. While the analysis is undertaken within the framework of the usual assumptions of linear viscoelasticity, the inclusion of temperature variation entails nonlinear equations. The propagation of shear and dilational waves is investigated in a linear approximation whose range of validity is ascertained; thermomechanical effects appear to be more severe than in the corresponding elastic problem. (Author)

AD-282 001 $0.50

Directorate of Materials and Processes, Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
CALCULATION OF STACKING FAULT ENERGIES FOR FACE-CENTERED CUBIC METALS, by Harold L. Gegel. Rept. on Characterization of Solid Phase and Interphase Phenomena in Crystalline Substances. May 62, 15p. 14 refs. ASD TDR-62-388.

DESCRIPTORS: *Metallic crystals, Crystal structure, Fracture (Mechanics), Energy, Oscillators.

A theoretical investigation was undertaken to determine the stacking fault energy for face-centered cubic metals. An expression was derived which relates the Debye characteristic temperature of the metal and the absolute temperature to the stacking fault energy. An Einstein oscillator was used as a model for the derivation. (Author)

PB 153 936-2 $4.60

New York U., N. Y.
SOLID STATE RADIATION-INDUCED PHENOMENA, by Hartmut Kallmann. Quarterly rept. no. 2, May-July 60, on Contract DA 36-039-sc-85126. Sep 60, 41p. AD-245 813.

DESCRIPTORS: *Solids, *Organic solvents, Solutions, Photoconductivity, *Luminescence, Measurement, Infrared radiation, Conductivity, Photoelectric effects, *Fluorescence, Illumination

Experimental data on quenchers in liquid organic solution are given. The quenching of carbontetrachloride, hexachloro-p-xylene and chloroform are compared since it was desired to investigate the effect of quenchers of various degrees. All give linear values of the quenching factor. Data on the quenching effects of dilution of the transferrer are presented. The quenching is considerably reduced by this dilution. Data on the effect of solute concentration on the amount of quenching are presented. The behavior of some of the substances is in agreement with the theory previously given but some show considerable deviations. Previous measurements of the photoconductivity were extended to measurements of the conductivity during the glow, which is the heating period after preceding excitation. It was found that the conductivity during the heating period behaves analogous to the luminescence intensity. I. R. irradiation produces effects which can be explained if one assumes that I. R. does not release trapped electrons but increases the recombination probability. This explanation also holds for I. R. effects on the luminescence. (Author) (See also PB 153 936)

PB 153 936-3 $3.60

New York U., N. Y.
SOLID-STATE RADIATION-INDUCED PHENOMENA, by Hartmut Kallmann. Quarterly rept. no. 3, Aug-Oct 60, on Contract DA 36-039-sc-85126. Dec 60, 35p. 12 refs. AD-249 484.

DESCRIPTORS: *Solids, *Conductivity, Photoelectric effects, Polarization, Electrical effects, *Fluorescence, Illumination, Organic compounds, Solutions

In solutions energy transfer from the bulk to emitter can possibly occur by means of different processes; this report concerns attempts at discriminating among the processes by adding quenching materials and studying resulting effects on the fluorescence. The experimental results are compared with a theoretical formula derived from first order processes. A comparison between results in rigid plastic and liquid solutions aids in sorting out the processes. It is found that some solutions behave in accordance with the predictions of the theory whereas others do not. An analysis of possible reasons for the discrepancies is given. Zinc sulfide; copper/chlorine phosphors were prepared and their relative capacity change measured. This represents the beginning of a program arrived at relating the chemical and physical conditions of preparation to the electrical properties of phosphors. Apparatus was constructed for the preparation of organic crystals by the Bridgman method. The furnace and controls are described. (Author) (See also PB 153 936-2)

ORNL-TM-229 $4.60

Oak Ridge National Lab., Tenn.
OR ABS:A FORTRAN PROGRAM FOR CALCULATING SINGLE CRYSTAL ABSORPTION CORRECTIONS, by D. J. Wehe, W. R. Busing, and H. A. Levy. Apr 62, 44p. 9 ref.

OTS SB-488 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
MASERS AND LASERS. July 62, 11p. 208 refs. OTS Selective Bibliography SB-488.

Electronics

AD-282 210 $2.25

Arizona U., Tucson.
STUDY AND RESEARCH ON ELECTRONIC SIMULATION OF THE BIOLOGICAL CLOCK, by Andrew P. Sage, Jr., E. Lendell Cockrum and others. Final rept. on Contract AF 33(616)7677. May 62, 91p. 19 refs. ASD TDR-62-191.

DESCRIPTORS *Bioelectronics, Biology, Cybernetics, *Animals, *Light adaptation, *Dark adaptation, Simulation, Reaction (Physiology), *Analog computers, *Digital computers, Light, Stimulation, *Electronic recording systems.

The term "biological clock" has been given to the phenomenon displayed by organisms, both plants and animals, that pace their function in a cyclic fashion related in some way to environmental stimuli. Since most of the quantitative studies of the biological clock have been made using members of the animal kingdom, the study has been restricted to this area. The report begins with a general review of the literature on the biological aspects of light and temperature in relation to pacemaking. Both periodic and random shock effects, including the effects of periods different from twenty-four hours, frequency demultiplication, variation of intensity and duration of shocks, and multiple shocks, are described. The above data is translated into a general mathematical model for the biological clock. A hybrid (digital-analog) model for the biological clock is then proposed. The electronic model consists basically of a sequential logic circuit, an analog response computer, and an activity state control. The sequential logic circuit is the basic decision mechanism which determines the changes to be made in activity state on the basis of past and present activity states and external stimuli. The analog portion of the model is used to determine the exact amount of change to be made; the activity state control represents the present activity state and receives all command inputs for state changes. (Author)

AD-278 521 $1.25

Navigation and Guidance Lab., Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
LASERS FOR AEROSPACE WEAPONRY, by Janis Sirons Summary rept. on Weaponization of Submillimeter Electromagnetic Technique. May 62, 48p. ASD-TDR-62-440.

DESCRIPTORS: *Ruby, *Light, Oscillators, *Optics, Energy, Amplifiers, Mathematical analysis, *Space navigation, Instrumentation, Electromagnetic waves, *Microwave oscillators, *Crystals, Generators, Doppler systems, *Radar systems, *Optical systems, *Electronics, Weapons.

This report presents a summary of the state-of-the-art in Laser research. Characteristics of the present Ruby Laser are described and compared with idealized characteristics. Mathematical calculations of performance using existing and idealized parameters are performed. Research to improve existing Lasers is described, including new crystal materials, new sources of optical energy, and new Lasering techniques. A program is outlined to direct future Laser research and apply the developments effectively. (Author)

Molecular Physics and Spectroscopy

AD-278 829 $0.50

Brussels U. (Belgium).
VAPORIZATION OF COMPOUNDS AND ALLOYS AT HIGH TEMPERATURES: ON THE EXISTENCE OF GASEOUS SULPHIDES OF THE TRANSITION ELEMENTS, by R. Colin, P. Goldfinger, and M. Jeunehomme. Rept. for Apr 61-Apr 62, on Refractory Inorganic Non-Metallic Materials, Contract AF 61(052)225. May 62, 10p. 12 refs. Technical Documentary rept. WADD-TR-60-782, Part IV.

DESCRIPTORS: *Vaporization, High temperature research, Gases, *Sulfides, *Refractory materials, Alloys, *Transition elements, Vapors, Mass spectroscopy, *Manganese compounds, Thermodynamics, Dissociation.

Thermodynamic considerations permit the prediction of the mode of vaporization of transition element sulphides. MnS is the only clear case where the gaseous sulphide molecule has an appreciable concentration in the saturated vapor. This is confirmed by a mass spectrometric investigation which gave us the measurement D_0^0 (MnS) = 65 ± 5 Kcal/mole. (Author)

PB 154 112 $1.60

Mallinckrodt Chemical Lab., Harvard U., Cambridge, Mass.
THE APPLICATION OF SYMMETRY PRINCIPLES TO THE ROTATION-INTERNAL ROTATION LEVELS OF MOLECULES WITH TWO EQUIVALENT METHYL GROUPS, by Rollie J. Meyers (U. of California) and E. Bright Wilson, Jr. Rept. on Contract Nonr-1866, T.O. 14. [1960] 20p. 10 refs. AD-234 158.

DESCRIPTORS: *Molecular spectroscopy, *Molecular rotation, Methyl radicals, Molecular structure, Microwave spectroscopy, Groups (Mathematics), Transformations (Mathematics).

The set of coordinate transformations, corresponding to symmetry operations, which leave invariant the Hamiltonian operator for a molecule with two equivalent methyl groups, is obtained. These constitute a group which is a direct product of two simple groups, i. e. $C_{3v} \times C_{3v}$. The possible species for the energy levels, their degeneracies, their statistical weights, and the selection rules are worked out by group theory techniques which use only the properties of the smaller groups. The higher symmetry and higher degeneracies given by approximate Hamiltonians are briefly discussed. (Author)

NYO-10058 $2.60

Massachusetts Inst. of Tech., Cambridge.
THE DEVELOPMENT AND USE OF NEW SPECTROSCOPIC METHODS FOR ISOTOPE ANALYSIS AND ZEEMAN EFFECT STUDIES, by George R. Harrison. Final summary rept. 1 Apr 57-31 Mar 62, on Contract AT(30-1)-2013. 31 Mar 62, 21p.

NYO-7989 $2.60

Princeton U., N. J.
DIFFUSION OF A PLASMA ACROSS A MAGNETIC FIELD, by Lyman Spitzer, Jr. Technical memo. 50 on Project Matterhorn. 3 Aug 57, 15p.

Thermodynamics

ATL-A-123 $2.60

Advanced Technology Labs., Mountain, Calif.
EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF ULTRASONIC VIBRATIONS ON BURNOUT HEAT FLUX WITH BOILING WATER, by F. E. Romie and C. A. Aronson. Final summary rept. on Contract AT(04-3)-250. 31 July 61, 21p. 7 refs. EURAEC-217.

ATL-A-122 $1.10

Advanced Technology Labs., Mountain View, Calif.
EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF ULTRASONIC VIBRATIONS ON BURNOUT HEAT FLUX WITH BOILING WATER, by F. E Romie. Quarterly technical progress rept. Apr-June 61, on Contract AT(04-3)-250. 7p. EURAEC-157.

AD-282 006 $1.50

Carbon Research Lab., U. of Buffalo, N. Y.
INVESTIGATION OF ELASTIC AND THERMAL PROPERTIES OF CARBON-BASE-BODIES, by S. Mrozowski, J. F. Andrew and others. Final rept. Nov 60-Jan 62, on Refractory Inorganic Nonmetallic Materials, Contract AF 33(616)7791. June 62, 53p. 14 refs. WADC-TR-58-360, Part IV.

DESCRIPTORS: *Graphite compounds, *Carbon compounds, Elasticity, *Thermal conductivity, *Thermal diffusion, High temperature research, Heat treatment, Temperature, Electronics, Internal friction, Vibration, Thermodynamics, Deformation, Refractory materials.

Families of curves of the dependence of Young's modulus on temperature and on the heat treatment have been obtained for four basic types of carbons, using the shortly completed high temperature equipment. The decisive influence of filler type has been established. As a result of gained experience, improvements in the associated electronics were introduced. The amplitude dependence of the internal friction and dynamic Young's modulus were, for the first time, investigated at room temperature for vibrations in the sonic range of frequencies for several types of carbons. Reproducibility has been achieved in measurements of thermal conductivity with the new high temperature test apparatus and families of curves of the dependence of the conductivity on temperature and on heat treatment obtained for soft carbon. A new technique of determining the heat conductivity of carbons without internal heat generation has been tried and found to work up to 1800°C. Improved results were obtained with the transient state technique of determination of the heat diffusivity by using a new fast responding pyrometer and a new improved apparatus for the "steady" sinusoidal wave technique constructed. (Author) (See also AD-258 531)

DC-59-3-207 $2.60

General Electric Co., Cincinnati, Ohio.
PRELIMINARY THERMOCHEMICAL CALCULATIONS FOR THE VAPOR PLATING OF ALUMINA, by G. R. Van Houten. 24 Mar 59, 20p. 2 refs.

AD-278 570 $2.75

Heat Transfer Lab., U. of Minnesota, Minneapolis.
AN INVESTIGATION OF THE ANODE LOSSES IN ARGON ARCS AND THEIR REDUCTION BY TRANSPIRATION COOLING, by Peter A. Schoeck, Ernest R. G. Eckert, and Steve A. Wutzke. Interim technical rept. on Mechanics of Flight, Contract AF 33(616)5528. Apr 62, 123p. 40 refs. ARL 62-341.

DESCRIPTORS: *Heat transfer, Velocity, Pressure, Measurement, *Sweat cooling, *Argon, Electrodes, Ablation, *Reduction, *Electric arcs, Boundary layer, *Anodes, Energy, Intensity, Voltage, Plasma physics.

Experiments were conducted to determine the nature of the energy transfer at the anode. The contribution of the various energy transfer phenomena, which are convective heat transfer, radiative heat transfer and energy transfer by electrons to the total energy flow into the anode surface, were determined. The flow field in the arc resulting from electromagnetic forces was investigated. The radial distribution of heat flow and current at the anode surface was measured for currents between 50 A and 150 at various electrode spacings. Experiments were conducted whose objective was the reduction of energy losses to the anode. For this purpose, the metal anode was replaced by a porous carbon plug of 0.5 in. diameter through which argon was injected into the arc. It was found that by a suitable design of the anode holder the anode losses could be reduced to less than 20% of the total arc energy. The dependence of arc voltage on gas injection rate through the anode surface was measured for a number of electrode spacings. (Author)

NYO-9457 $6.60

Massachusetts Inst. of Tech., Cambridge.
SOME METHODS OF SURFACE ANALYSIS FOR THE PREDICTION OF THERMAL RESISTANCE OF METAL CONTACTS. Progress rept. Sep 60-Oct 61, on Contract AT(30-1)-2079. 1 Nov 61, 56p. 23 refs.

TID-16053 $4.60

Stanford Linear Accelerator Center, Stanford U., Calif.
INLINE CALORIMETER FOR MICROWAVE POWER MEASUREMENTS, by M. Michael Brady. Technical rept. on Contract AT(04-3)-363. Mar 62, 47p. 14 refs. M-295.

NDA-2169-2 $3.60

United Nuclear Corp., White Plains, N. Y.
INVESTIGATION OF WET STEAM AS A REACTOR COOLANT (CAN-2). Technical progress rept. 1 June-31 Aug 61, on Contract AT(30-1)-2828. 30 Sep 61, 40p. EURAEC-174; NYO-9842.

DESCRIPTORS: *Masers, Microwave amplifiers, Amplifiers, Optics, Light, *Bibliography

Lists 208 foreign and domestic references on Masers, Lasers, Irasers, and Rasers added to the OTS collection during the period 1956 to July 1962. Covers research on maser state-of-the-art, ruby and other maser materials, solid state masers and rasers, molecular and atomic resonance devices, maser focusser research, electronic gear for masers, infrared masers, rutile masers, laser properties and coherent light sources among other subjects. (Author)

PB 160 835 $5.60

Pennsylvania U., Philadelphia.
SEMI-CONDUCTOR RESEARCH. Quarterly rept. no. 3, Jan-Mar 53, on Contracts N6onr-24914, Nonr-61600 and AF 33(616)78. [1953] 59p. 32 refs. AD-14 711.

DESCRIPTORS: *Semiconductors, Oxides, *Zinc compounds, *Photoconductivity, *Meteorology, *Vacuum systems, Test methods, Temperature, Measurement, *Thermal radiation, Calibration, *Tellurium, Crystals, *Infrared photoconductors, Single crystals

Contents:
Photoconductivity of zinc oxide, by Donald Melnick
Method of measuring surface temperatures in vacuo, by Paul Miller
Infra-red optical properties of single crystals of tellurium, by Joseph J. Loferski

AD-281 805 $0.75

Politecnico di Milano (Italy).
RESEARCHES ON HYDROGEN OVERVOLTAGE ON METALLIC SINGLE CRYSTALS, by R. Piontelli, L. Peraldo Bicelli and others. Rept. for 1 July 60-30 June 61 on Hydrogen Evolution, Contract AF 61(052)144. May 62, 30p. 11 refs. ASD TDR-62-357.

DESCRIPTORS: *Metallic crystals, *Single crystals, Electrodes, *Hydrogen, Ionic currents, Voltage.

The purpose of the research work here summarized was the determination of the hydrogen-overvoltage for metallic single crystal electrodes (SCE), whose working surface was oriented following different lattice planes and for polycrystalline ones, in various conditions as far as current density (c. d.), temperature and other conditions are concerned. (Author)

PB 160 818 $11.50

Texas Instruments, Inc., Dallas.
SILICON CRYSTAL DEVELOPMENT PROGRAM, by W. R. Runyan, W. C. Herrmann, and L. C. Jones. Final rept. on Contract AF 33(600)33736. 25 Apr 58, 160p. Rept. no. 4-2739-4; AMC Technical rept. no. 58-7-517; AD-150 464.

DESCRIPTORS: *Silicon, *Crystals, Growth, Plasticity, Mechanical properties, Optics, *Infrared optical materials.

A survey was made of the mechanical properties of Si including hardness, resistance abrasion and thermal shock, and breaking strength. The plastic properties of Si were also studied. Crystal growing techniques were reviewed in order to select suitable ones for this investigation. The techniques were divided into the following categories: (1) growth from solutions, (2) growth from melts, (3) growth by vapor deposition, and (4) growth from or within solids. Studies were made of the hot forming properties of Si. Design parameters were established for equipment to press up to 4-in. domes. Heat forming of Si domes from flat disks was feasible using moderate force with temperature in the range 1325° to 1350°C. The maximum load necessary to form a 2.0-in. -diam hemisphere with 0.125 wall thickness was 1240 lb. The optical properties of Si including a comparison of twinned and single crystal material were investigated. Fabrication procedures were developed for grinding and polishing Si.

Theoretical Physics

OTS SB-426 Suppl. 1 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
MAGNETOHYDRODYNAMICS. Jan 62, 11p. 166 refs. OTS Selective Bibliography SB-426, suppl. 1.

DESCRIPTORS: *Magnetohydrodynamics, *Bibliography, *Plasma physics, Shock waves, Magnetic pinch, Theory, Power, Energy

Lists 185 foreign and domestic references added to the OTS collection during the period Sep 60-Jan 62. Covers research on basic theory and concepts, power generation and energy conversion, plasma physics, pinch dynamics, plasma shock waves, surface disturbances, magnetohydrodynamic flow among other subjects. (Author)

AD-282 325 $2.50

Plasmadyne Corp., Santa Ana, Calif.
STUDY OF MHD AND EHD FREE-CONVECTION ENERGY CONVERTERS, by Meredith C. Gourdine. Final rept. 4 Apr 61-31 Mar 62, on Contract AF 33(616)8007. June 62, 117p. 12 refs. Rept. FR022-8007; ASD TDR-62-320.

DESCRIPTORS: *Magnetohydrodynamics, *Plasma physics, Feasibility studies, Hall effect, Aerosols, *Convection, Energy, Theory, Thermodynamics, Conductivity, Measurement, Mathematical analysis

A theoretical and experimental feasibility study of single and two-phase free-convection MHD and EHD energy conversion is summarized in this report. Single-phase operation is shown to be impractical because the maximum possible efficiency of converting heat into flow kinetic energy is very low. On the other hand, two-phase operation is far more efficient and definitely has possibilities for practical energy conversion applications. (Author)

from follow-up research; (3) the ability to meet specifications on government contracts, including entree into fields where government contracts are available; (4) knowledge of the results of government research, condensed and interpreted; (5) background information leading to proprietary developments; and (6) ideas for diversification opportunities and for new businesses.

MISCELLANEOUS

PB 181 076 $1.25, $10.00/year

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Sep 62.

DESCRIPTORS: *Naval research, *Scientific research, Fuels, Fungi, Light, Scattering, Functions, Atmosphere, Astrophysics, Atmospheric electricity, Chemistry, Phosphates, Ignition, Ice, Adhesion, Sodium, Mechanics, Fracture (Mechanics), Thermal stresses, Plasma physics, Guns, Hypervelocity vehicles, Metallurgy, Ceramic materials, Silicon, Niobium, Nickel, Fatigue (Mechanics), Ferromagnetic materials, Films, Radiation effects, Conductivity, Iron alloys, Chromium alloys, Scale, Reactor theory, Steel, Explosions, Spinels, Nuclear physics, Detectors, Protons, Neutrons, Nuclear reactions, Equation, Radio, Buoys, Radio transmitters, Solid state physics, Ytterbium, Glass, Energy, Sound, Digital computers, Computers, Coatings, Scientific reports, Patents, Sound

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Articles:
Fuel and Fungi, by J. M. Leonard and Dorothea E. Klemme
Coronagraph with Improved Scattered Light Properties, by J. D. Purcell and M. J. Koomen
Scientific Program:
Applications Research: A method of synthesizing higher order functions in man-machine systems
Atmosphere and Astrophysics: Atmospheric electricity measurements in the North Atlantic during FALLEX-60
Chemistry: Effect of high temperatures on the stability and ignition properties of commercial triaryl phosphate fluids. Adhesion-shear strength of ice frozen to clean and lubricated surfaces. High-temperature properties of sodium
Mechanics: Thermal stress fracture in nonmetallic materials. Performance of a plasma gun for accelerating relatively large masses into the hypervelocity region. Analysis of spall fragments from hypervelocity impact
Metallurgy and Ceramics: Determination of trace amounts of silicon and niobium. Internal crack density results for nickel creep-tested at 1200°F in air and in vacuum. Comparisons of the surfaces of specimens fatigued at room temperature and 800°C in a vacuum of 2×10^{-6} torr. Effects of neutron irradiation on the magnetic properties of thin ferromagnetic films. In-pile measurements of the conductivity and Hall coefficient of silicon. Metallographic examination of a subscale formed on Fe-Cr alloys oxidized in water vapor atmospheres at high temperature. Surveillance of critical reactor components to assess radiation damage. Tensile properties of explosively formed mild steel plate. Explosion tear test studies of high-strength Q&T steels. Fracture properties of PVRC vessel No. 4. The stabilization of protective spinel films on steel to room-temperature breakdown in aqueous media
Nuclear and Atomic Physics: A simple way of using a multidetector array. Abstract mathematical model applied to interpret the nuclear forces involved in low-energy proton-neutron interactions. Solutions to the three-dimensional equation of radiative transport
Radio: Submarine-rescue vhf/uhf radio transmitting buoy exceeds specifications in all respects
Solid State Physics: Redistribution of stimulated emission energy in ytterbium-activated glass etalons
Sound: A digital computer program for calculating spheroidal wave function eigenvalues and expansion constants. NAREC computer programs for spheroidal radial functions, oblate radial functions, and spheroidal angle function
Supporting Techniques: Coatings for the Interior of Satellite-Borne Coronagraphs

NDA-2169-3 $6.60

United Nuclear Corp., White Plains, N. Y.
INVESTIGATION OF WET STEAM AS A REACTOR COOLANT (CAN-2). Technical progress rept. 1 Sep-30 Nov 61, on Contract AT(30-1)-2828. 31 Dec 61, 69p. 8 refs. NYO-9843; EURAEC-258.

AD-278 589 $1.75

Vidya, Inc., Palo Alto, Calif.
HIGH TEMPERATURE THERMODYNAMIC PROPERTIES OF SELECTED GASES, by Morton Rudin and Boris Ragent. Interim technical rept. on Mechanics of Flight, Contract AD 33(616)8338. May 62, 63p. 43 refs. ARL 62-358.

DESCRIPTORS: High temperature research, *Thermodynamics, *Gases, Air, Hydrogen, Nitrogen, Oxygen, Argon, Helium, Dissociation, Aerodynamics, Heat transfer, Groups (Mathematics), Number theory, Probability, Statistical analysis.

The recent literature dealing with the high-temperature thermo-dynamic properties for air, N_2, O_2, A, and He, computed theoretically from statistical thermodynamics, is reviewed. The relationships and interrelationships of thermodynamic quantities and partition functions are discussed. After estimating the accuracy possible with the present state-of-the-art, the sources of discrepancy among the various papers are examined and accuracies relative to those possible under the state-of-the-art are discussed. The individual character of each paper is reviewed in a chart containing information as to what data are available in the paper, the computing procedure used, and the expected accuracy. Recommendations regarding which tabulations are best or most useful for differing purposes in various temperature and pressure ranges are summarized in a table. (Author)

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

AD-273 348 repriced $1.00

California U., Los Angeles.
A SURVEY OF TECHNIQUES FOR THE ANALYSIS OF SAMPLED-DATA SYSTEMS WITH A VARIABLE SAMPLING RATE, by George A. Bekey. Rept. on Contract AF 33(616)7139. May 62, 33p. 22 refs. Rept no. 61-24;ASD-TDR-62-35.

DESCRIPTORS: Analysis, *Data processing systems, *Sampling, Feedback, *Control systems, *Difference equations, Transformations (Mathematics), Integration, Matrix algebra.

Several techniques are presented for the analysis of sampled-data systems with a non-constant sampling period. The application of z-transform techniques is limited to cases where the sampling pattern repeats periodically. Several special cases, including the cyclically-varying sampling period and the skipped-sample problem are outlined. The most general methods available are based on a direct solution of the system difference equations. These equations, while time consuming, do make possible the evaluation of transient response sample-by-sample. The advantages, limitations and possible extensions of the various methods are outlined. A number of simple examples and an extensive bibliography are included. (Author)

SOCIAL SCIENCES

PB 160 776 $10.50

George Washington U., Washington, D. C.
LOGISTICS PAPERS PREPARED UNDER VARIOUS AUSPICES, ISSUE NO. 11. Appendix 1 to Quarterly progress rept. no. 21, 16 Nov 54-15 Feb 55, on Logistics Research Project, Contract N7onr-41904. [1955] 133p. 24 refs. AD-59 619.

DESCRIPTORS: *Logistics, Supplies, Scheduling, Combinatorial analysis, Matrix algebra, Equations, Inequalities, Games theory, Transportation, Numerical analysis.

Contents:
The tail, the dog, and the snowball, by H. E. Eccles
Application of a minimax technique to a forecasting problem at a supply demand control point, by Joseph P. Fennell
A combinatorial algorithm for the assignment problem, by H. W. Kuhn
On combinatorial properties of matrices, by E. Egervary
Transposition theorems for linear equations and inequalities, by A. W. Tucker
An extension of a theorem of Dantzig's, by I. Heller and C. Tompkins
On the shortest spanning subtree of a graph and the traveling salesman problem, by Joseph B. Kruskal, Jr.
Linear homogeneous attrition games, by J. R. Isbell
A dynamic transportation model, by James E. Kelley, Jr.
A computational technique for the scheduling problem, by Melvin E. Salveson

PB 181 337 $0.75

Williams, Clyde and Co., Columbus, Ohio.
GOVERNMENT PATENTS: HOW THEY BENEFIT INDUSTRY. AN EVALUATION OF COMMERCIAL APPLICATIONS, by Robert E. Greenlee and William H. Bickley. Rept. on Contract CC 4569. [1962] 21p. 28 refs.

DESCRIPTORS: Federal government, *Patents, Invention, Military research, *Industry, Public opinion polls.

Information is presented that was obtained from evaluating responses by 106 companies out of 393 that were queried by letter, telephone, and personal interview about the possible benefits of government patents and patent licenses to their operations. (The other 287 companies either failed to respond to query, or knew nothing about the subject, or preferred not to comment.) Of the 106 companies who responded, 72 had obtained royalty-free licenses. The study indicated that the benefits that industry gains from government-owned patents and licenses to them include: (1) the right to use for private business purposes the inventions resulting from government research; (2) protection of rights to proprietary inventions resulting

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